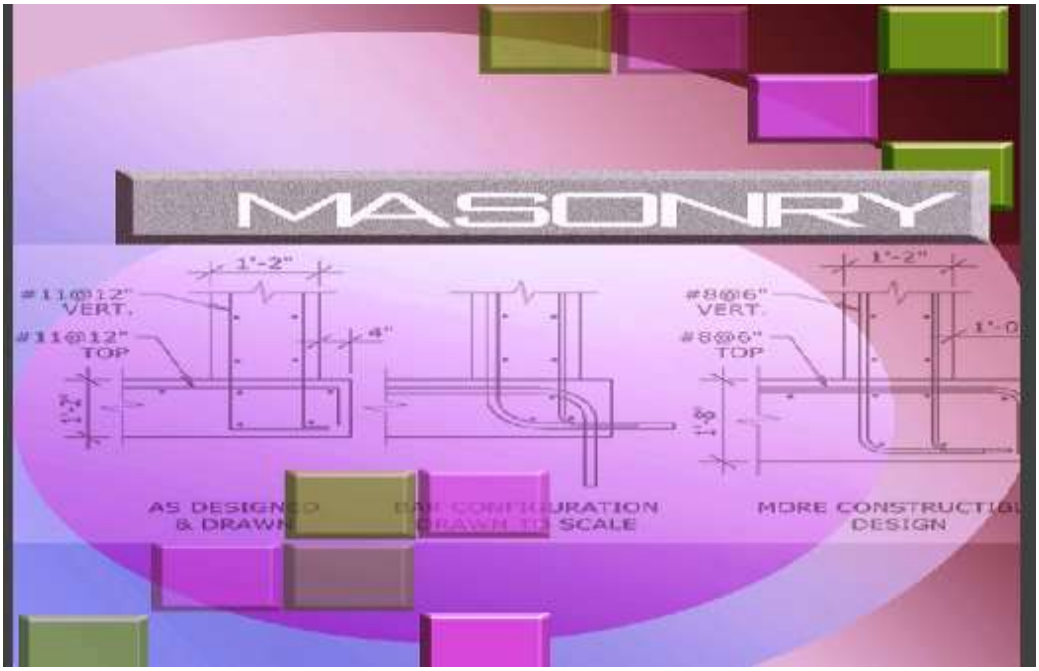
Republic of the Philippines
**DEPARTMENT OF EDUCATION**

# K to 12 Basic Education Curriculum
## Technology and Livelihood Education
## Learning Module




# MASONRY

*EXPLORATORY COURSE*

*Grades 7 and Grade 8*

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# What Is This Module About?

Welcome to the world of ***Masonry!***

This Module is an exploratory course which leads you to **Masonry** National Certificate Level II ( NC II)[1]. It covers **5** common competencies that a Grade 7 / Grade 8 Technology and Livelihood Education (TLE) student like you ought to possess, namely:

1). Prepare construction materials and tools;
2). Practice housekeeping procedures;
3). Observe procedures, specifications and manuals of instructions;
4). Perform mensuration and calculations; and
5). Maintain tools and equipment.

These **5** common competencies are covered separately in 5 Lessons. As shown below, each Lesson is directed to the attainment of one or two learning outcomes:

**Lesson 1** – Prepare Construction Materials and Tools
LO1. Identify materials and tools applicable to a specific construction job
LO2. Request appropriate materials and tools
LO3. Receive and inspect materials

**Lesson 2** – Practice Housekeeping Procedures
LO1. Maintain work areas, tools and equipment
LO2.Follow standard work processes and procedures

**Lesson 3** – Observe Procedures, Specifications and Manuals of Instructions
LO1.Identify access, and interpret specification materials.
LO2. Apply information from the manual.
LO3. Store the manuals.

**Lesson 4** – Perform Mensurations And Calculations:
LO1. Carry out measurement and calculations
LO2. Select measuring instruments

**Lesson 5** – Maintain Tools and Equipment
LO1. Check conditions of tools and equipment
LO2. Perform basic preventive maintenance
LO3. Store tools and equipment learning outcomes

Your success in this exploratory course on **Masonry** is shown in your ability to perform the performance standards found in each lesson.

[1]***NATIONAL CERTIFICATE (NC) is*** *a certification issued to individuals who achieved all the required units of competency for a national qualification as defined under the Training Regulations. NCs are aligned to specific levels within the PTQF.* ***(TESDA Board Resolution No. 2004-13, Training Regulations Framework)***

***NATIONAL CERTIFICATE LEVEL*** *refers to the four (4) qualification levels defined in the Philippine TVET Qualifications Framework (PTQF) where the worker with:*

*a.* ***NC I*** *performs a routine and predictable tasks; has little judgment; and, works under supervision;*

*b.* ***NC II*** *performs prescribed range of functions involving known routines and procedures; has limited choice and complexity of functions, and has little accountability;*

# How Do You Use This Module?

This Module has 5 Lessons. Each Lesson has the following parts:

- Learning Outcomes
- Performance Standards
- Materials
- References
- Definition of Terms
- What Do You Already Know?
- What Do You Need to Know?
- How Much Have You Learned?
- How Do You Apply What You Learned?
- How Well Did You Perform?
- How Do You Extend Your Learning?

To get the most from this Module, you need to do the following:

- Read the Learning Outcome/s and Performance Standards. These tell you what you should know and be able to do at the end of this Module.

- Find out what you already know by taking the Pretest then check your answer against the Answer Key. If you get 99 to 100% of the items correctly, you may proceed to the next Lesson. This means that you need not go through the Lesson because you already know what it is about. If you failed to get 99 to 100% correctly, go through the Lesson again and review especially those items which you failed to get.

- Do the required Learning Activities. They begin with one or more Information Sheets. An Information Sheet contains important notes or basic information that you need to know.

  After reading the Information Sheet, test yourself on how much you learned by means of the Self-check. Refer to the Answer Key for correction. Do not hesitate to go back to the Information Sheet when you do not get all test items correctly. This will ensure your mastery of basic information.

- Demonstrate what you learned by doing what the Activity/Operation/Job Sheet directs you to do.

- Apply what you have learned in another activity or in real life situation.

- Accomplish the Scoring Rubrics for you to know how well you performed.

Each Lesson also provides you with references and definition of key terms for your guide. They can be of great help. Use them fully.

If you have questions, ask your teacher for assistance.

.

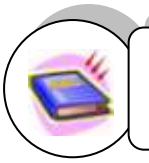
LESSON 1

# Prepare construction materials and tools

## LEARNING OUTCOMES:

**At the end of this Lesson you are expected to do the following:**

**LO1. identify materials and tools applicable to a specific construction job;**
**LO2. request appropriate materials and tools; and**
**LO3. receive and inspect materials.**



# Definition of Terms

**Ashlar** – a quarry cut to produce smooth, flat bedding surface that stack easily

**Block –** short term for Concrete Hollow Block; it consists of an outside shell with a hollow center that is divided into two or three vertical webs

**Brick** – made of clay and other materials processed into workable consistency, molded to sizes, and fired in a kiln for stronger and more attractive product

**Control measures –** set of procedures, guidelines or standards used to regulate or systematize performance of shop tasks or jobs according to certain standards

**Course Ashlar** – stone arrangement which has a formal appearance

**Course Rubble** – stone which has a neater appearance than random rubble but more difficult to construct and requires a large selection of stones

**Electronic method –** type of requisitioning of supplies, tools, and equipment through the use of computer unit instead of the usual slip

**Finishing tools** – tools used for smoothening, roughening, plastering, and finishing surfaces with mortar or plaster

**Masonry** – the structural construction of component parts laid in and bound together by a material called as mortar

**Material Handling** – the movement, storage, control and protection of materials, goods and products throughout the process of manufacturing, distribution, consumption, and disposal

**Material Management –** scientific method of ensuring that all items including tools and equipment are released and utilized properly according to the requirement and shop guidelines

**Mortar –** workable paste used to bind construction blocks together and fills the gaps between stocks

**Quality inspection –** formal evaluation technique to ensure that deliveries are in accordance with the specifications, quantity, and functionality or workability

**Random ashlar** – arrangement of stones wherein various sizes are used to make courses that are not continuous for the whole length of the wall

**Random Rubble** – stone that is usually dry – laid but can also be mortared

**Roughing up tools –** those tools necessary in the process of preparing, arranging, forming, laying and shaping of bricks, stones and masonry blocks

**Rubble** – stone that is irregular in size, shape, and texture

# LEARNING OUTCOME 1

**Identify materials and tools applicable to a specific construction job**

## PERFORMANCE STANDARDS

- Materials and tools are received and inspected as per quantity and specification based on requisition.
- Tools and materials are checked for damages and manufacturing defects.
- Materials and tools received are handled with appropriate safety devices.
- Materials and tools are set aside for appropriate location nearest the workplace.

## What Do You Already Know?

**Let us determine how much you already know about Identifying materials and tools applicable to a specific construction job. Take this test.**

**Pretest LO 1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which is the structural construction of component parts laid in and bound together by a material called mortar?
   A. Building Construction
   B. Masonry
   C. CHB
   D. Stone

2. Which of the following is a masonry material?
   A. brick
   B. granite
   C. glass block
   D. all of the above

3. Which requires that quality of masonry materials should be of general standards?
   A. Association of Phil. Architectures
   B. Association of Phil. Engineers
   C. 2003 International Building Code
   D. 2003 International Baptist Code

4. What material reinforces the structure of masonry materials?
   A. mortar
   B. cement
   C. steel
   D. CHB

5. Which has a formal appearance of bond pattern?
   A. rubble stone
   B. combination ashlar
   C. random ashlar
   D. none of the above

6. What does CHB stand for?
   A. cement, hall, block
   B. code, housing, building
   C. concrete hollow block
   D. none of the above

7. How many classifications of masonry tools are there?
   A. 3
   B. 4
   C. 5
   D. none of the above

8. Which is **NOT** a roughing up tool?
   A. Crandall
   B. cold chisel
   C. patent hammer
   D. claw hammer

9. Which is **NOT** a finishing tool?
   A. bull float
   B. carpet float
   C. devil floating
   D. none of the above

10. Which is **NOT** part of the group?
    A. Brick trowel
    B. Buttering trowel
    C. edger
    D. none of the above

# What Do You Need To Know?

**Read Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.**

**Information Sheet 1.1**

## MASONRY AND MATERIALS

Have you seen walls of beautiful buildings and monuments? How are they made attractive and structurally durable? Those are just some works in masonry. Masonry can be defined in so many ways depending on uses or purposes. Therefore, let's define it on the structural context according to the purpose of this module.

Masonry is the structural construction of component parts laid in and bound together by a material called mortar. These individual materials which are introduced in any structure for various purposes and patterns may be tile, brick, granite, limestone, glass and concrete block, stucco, marble, stone, and travertine. The production of masonry units should generally conform to the requirements in the 2003 International Building Code (IBC) Section 2103. Aside from mortar, assembling these units can be reinforced appropriately by steel (rebar) that offers much strength to structures.

**Stone Types and Varieties of Bond Pattern**

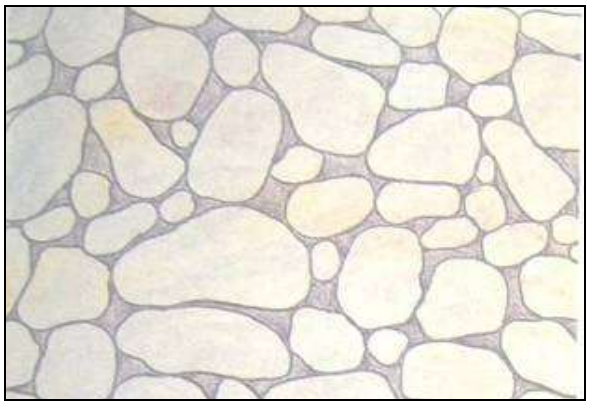
Masonry stones are in various forms and set in different patterns depending on certain considerations. Such stones chosen for various purposes have several varieties:

1. **Ashlar** is a quarry cut to produce smooth, flat bedding surface that stack easily. It is generally cut into small rectangles with sawed or dressed face.

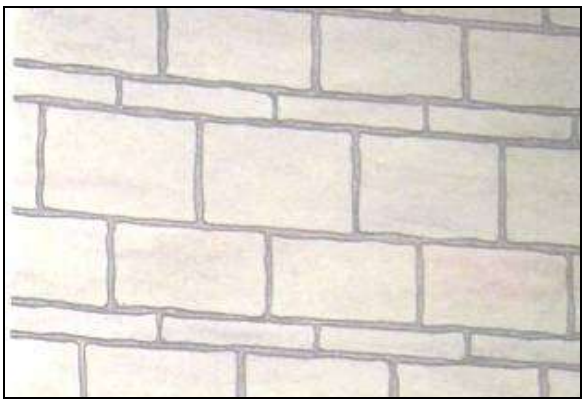
2. **Random ashlar** is an arrangement of stones where in various sizes are used to make courses that are not continuous for the whole length of the wall. However, course ashlar has a formal appearance.

3. **Rubble** is a stone that is irregular in size, shape and texture. Field stone is one type of rubble. Random rubble is usually dry – laid but can also be mortared. Course rubble has a neater appearance than random rubble but more difficult to construct and requires a large selection of stones.

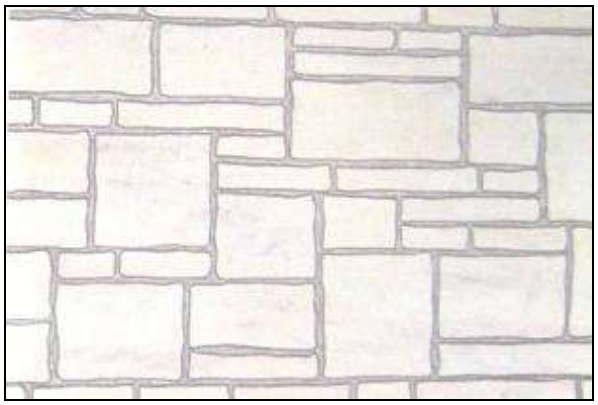
Random Rubble



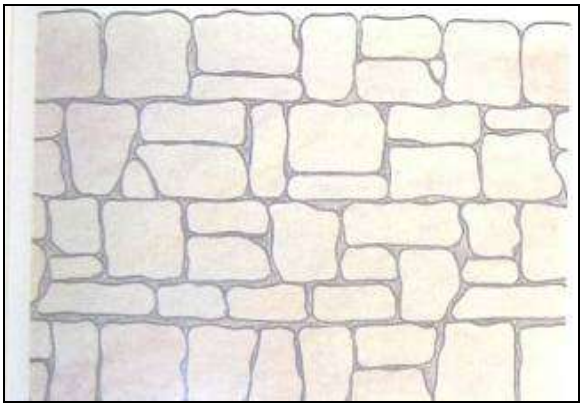
Coursed Ashlar



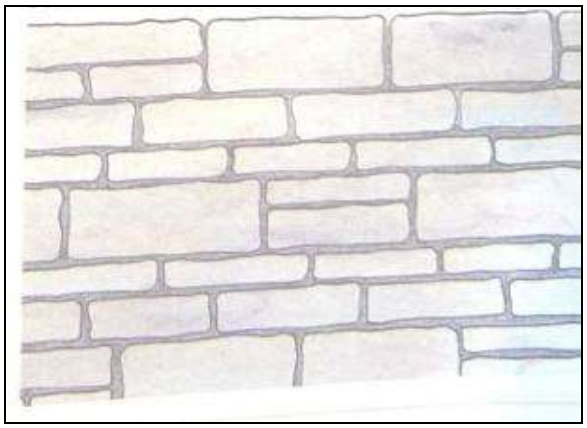
Random Ashlar



Coursed Rubble



Combination Ashlar



Mosaic Rubble

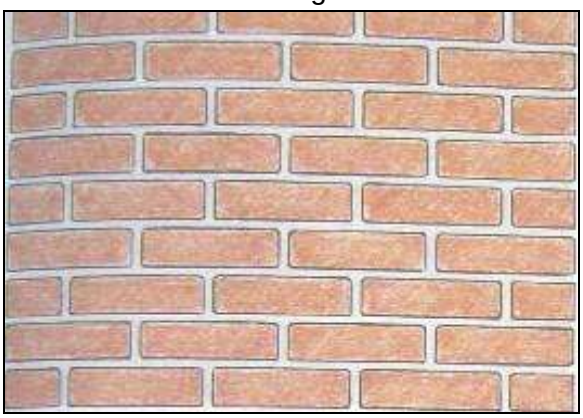
**BRICKS.** There are three clasifications of bricks

1. **Common Bricks** are made from clay and sold at the market.
2. **Face Bricks** are used for exterior and interior walls and other architectural structures.
3. **Calcium Silicate Bricks** are made with alumina and silica and are used for furnaces and other structures that require higher temperature up to 178 $^{o}$C.

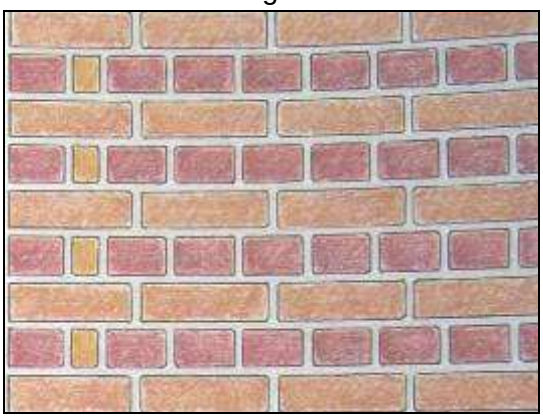
**Brick Laying and Patterns**

Bricks are laid in horizontal or vertical layer with a string or nylon chord as guide. The vertical layer of bricks is guided by a plumb line wherein the mortar having a thickness of 3 to 10 mm. is placed between layers.

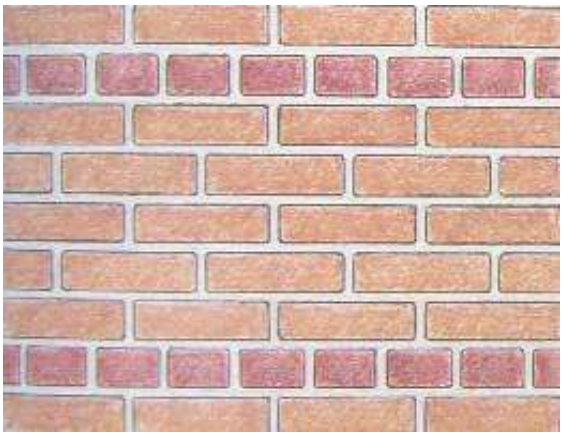
Running



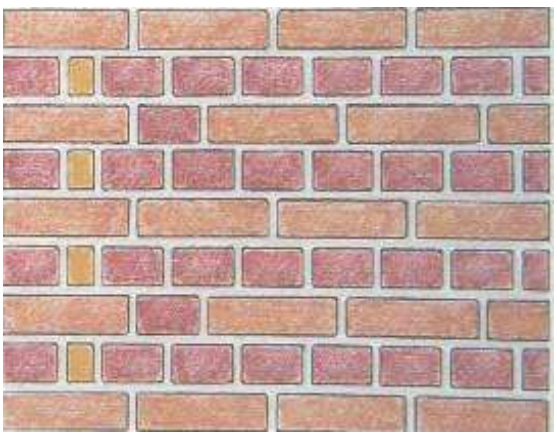
English



Common

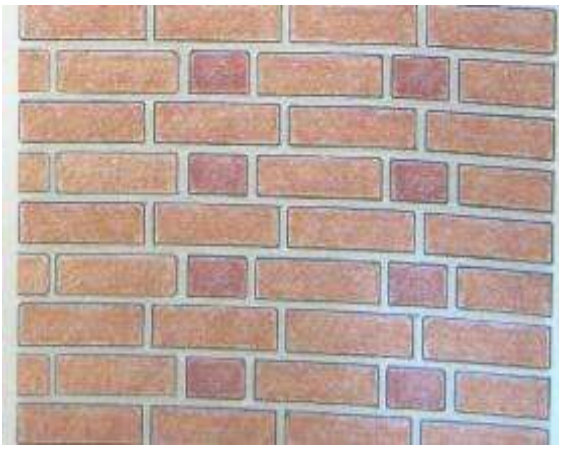


Dutch



Garden Wall

Flemish



**BLOCKS.** There are many types of blocks which are most widely used as masonry materials.

1. The **CHB** (sometimes called as Concrete Hollow Block) is used for all the types of construction walls, partitions, dividers, fences, etc., it. Generally, a block consists of an outside shell with a hollow center that is divided by two or three vertical webs. The end unit may have flanges that accept mortar and join with the other adjacent blocks (except blocks intended for corners and the end of walls).

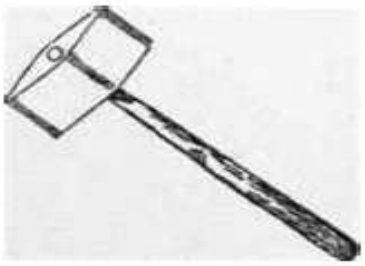
## MASONRY TOOLS

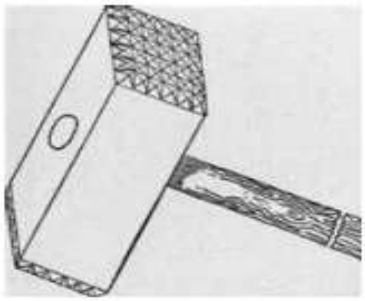
Appropriate tools are adopted in masonry to suit the kind of work involved. It also includes some carpenter tools such as the measuring tools, testing tools, and fastening tools. They are classified into two categories.

1. Roughing up Tools
2. Surface finishing tools

Roughing up tools are those tools necessary in the process of preparing, arranging, forming, laying, and shaping of bricks, stones, and masonry blocks. Tools of this type of work are mostly striking tools such as:

1. Masons Axe or Hammer
2. Patent Hammer
3. Brick Hammer
4. Crandall
5. Cross Pen Hammer
6. Cold Chisel
7. Star Drill
8. Bolster
9. Wrecking Baron





**Surface Finishing Tools Classifications**

1. Float
2. Trowels

**Floats Classification**

1. Common Float
2. Bull Float
3. Carpet Float
4. Devil or Nail Floating
5. Angle Floating

**Different Kinds of Trowel**

1. Ordinary Trowel
2. Pointing Trowel
3. Brick Trowel
4. Buttering Trowel
5. Edger
6. Margin Trowel

## How Much Have You Learned?

**Self-Check 1.1**

**Directions**: This part checks your prior leaning on the topics covered in this module. You will simply encircle the best answer from the choices given

1. Which is the structural construction of component parts laid in and bound together by a material called mortar?
   A. Building Construction
   B. Masonry
   C. CHB
   D. Stone

2. Which is a masonry material?
   A. brick
   B. granite
   C. glass block
   D. all of the above

3. Which requires that quality of masonry materials should be of general standards?
   A. Association of Phil. Architectures
   B. Association of Phil. Engineers
   C. 2003 International Building Code
   D. 2003 International Baptist Code

4. What material reinforces the structure of masonry materials?
   A. mortar
   B. cement
   C. steel
   D. CHB

5. Which has a formal appearance of bond pattern?
   A. rubble stone
   B. combination ashlar
   C. random ashlar
   D. none of the above

6. What does CHB stand for?
   A. cement, hall, block
   B. code, housing, building
   C. concrete hollow block
   D. none of the above

7. How many classifications of masonry tools are there?
   A. 3
   B. 4
   C. 5
   D. none of the above

8. Which is **NOT** a roughing up tool?
   A. Crandall
   B. cold chisel
   C. patent hammer
   D. claw hammer

9. Which is **NOT** a finishing tool?
   A. bull float
   B. carpet float
   C. devil floating
   D. none of the above

10. Which is **NOT** part of the group?
    A. Brick trowel
    B. Buttering trowel
    C. edger
    D. none of the above

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 1.1**

**Directions:** Do the following tasks. Write your answers/responses on your answer sheet.

A. Explain briefly the meaning of masonry.
B. What are the common masonry materials and tools according to their types and uses?

**Activity Sheet 1.2**

**Directions:** Suppose you were told to improve the appearance of the rough concrete surface of the front wall of your house. The problem is your tight budget. What masonry materials and tools will you use? Why do you choose such materials and tools? What will you do to determine the right quantity of the materials needed?

**Job Sheet 1.1**

**Directions:** Set up appropriate masonry materials on a piece of board or plywood.

**Materials, Tools, Equipment:**

- Piece of board or at least 3/4 " plywood
- Wood Nails
- Mortar
- Mesh wire or tie wire
- Masonry materials
- Finishing tools

**Procedure:**

1. Prepare a simple plan in setting up certain n masonry materials and tools on a piece of board or plywood.
2. Observe carefully the procedure specified in the plan.
3. Record significant observations and techniques or tips for preparing the mortar to set up the chosen masonry materials.
4. Evaluate the finished group project based on the performance assessment criteria given below:

## How Well Did You Perform?

**Directions:** Check the appropriate acceptability rating based on your honest personal evaluation of your project.

**PERFORMANCE ASSESSMENT CRITERIA ACCEPTABILITY**

| | Yes | Not so Much | Not At All |
|---|---|---|---|
| 1. Correct setting of string guide | | | |
| 2. Levelness of string guide | | | |
| 3. Proper amount of mortar bed | | | |
| 4. Correct alignment of CHB | | | |
| 5. Proper amount of mortar cells | | | |
| 6. Proper removal of excess mortar | | | |
| 7. Acceptability of the finished job | | | |
| TOTAL | | | |

**Submit your personal assessment rating, group observations and tips about the project.**

# How Do You Extend Your Learning?

## Assignment Sheet 1.1

**Directions:**

1. This activity is to be printed on short size bond paper.
2. Fasten the sheets with paper fastener in a short size folder with proper label.
3. Choose at least 5 masonry materials.
4. Find out how each of them is set/laid on the concrete wall surface. What particular mortar and tools should be used?

## Assignment Sheet 1.2

**Directions:**

1. This is a group work.
2. Prepare a simple plan on setting up certain masonry materials on a piece of board or plywood.
3. Prepare the materials, tools, and the procedure to be observed in doing this simple project.
4. Include some illustrations of steps especially laying in the masonry materials similar to the illustrations arranged according to major steps shown below:

board or plywood

masonry material

Phase 1(Step 1) --- to ------- Last Phase (last step)

5. Then, find out and prepare the appropriate mortar for this purpose.
6. Finally, secure the teacher's approval of your simple plan.

# LEARNING OUTCOME 2

**Request appropriate materials and tools**

## PERFORMANCE STANDARDS

- Needed materials and tools are listed per job requirement.
- Materials and tools are requested according to the prepared list.
- Requests are done per company's Standard Operating Procedures (SOP).
- Materials and tools are replaced appropriately at the expense of work quality and cost.

## What Do You Already Know?

**Let us determine how much you already know about requesting appropriate materials and tools. Take this test.**

**Pretest LO 2**

**I.** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which contains information about certain services required for performance?
   A. borrower's slip
   B. job order
   C. requisition slip
   D. borrower and job slips

2. Which specifies a demand for materials, supplies, or tools?
   A. borrower's slip
   B. job order
   C. requisition slip
   D. borrower and job slips

3. It contains an accepted form of request for tools, materials, and equipment on due time?
   A. borrower's slip
   B. job order
   C. requisition slip
   D. borrower and job slips

4. Normally, how many signatories are there in the Requisition Slip?
   A. 1
   B. 2
   C. 3
   D. 4

5. What happens when any of the slips lack the necessary data?
   A. There is delay in processing.
   B. Promptness of approval is at stake
   C. Misunderstanding occurs
   D. all of the above

**II.** Explain the purpose and importance of the following documents.

1. Requisition Slip
2. Borrower's Slip

# What Do You Need To Know?

**Read Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.**

**Information Sheet 2.1**

## JOB ORDER AND REQUISITION SLIPS

Requisition is made through a required form known as requisition slip or in the form of a letter, if the previous is not available. Most government offices use uniform requisition slip, while others have their own. In school shops, teachers are creative enough to devise their own form to suit their local need. Such practice of using requisition slip promotes proper monitoring of supplies, materials, tools, and performance and accomplishment of required service or services among others. Here are some examples of requisition forms according to their purpose.

SRJC
BOOKSTORE

**Textbook Requisition Form**

Hotel-XYZ

Serial No: Date:

| S/no | Items/ particulars | Quantity Ordered | Quantity Received | Remarks |
|---|---|---|---|---|
| 1 | Soaps | 50 no's | 50 no's | |
| 2 | Shampoos | 100 no's | 80 no's | 20 no's are balance |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Requested By: _____

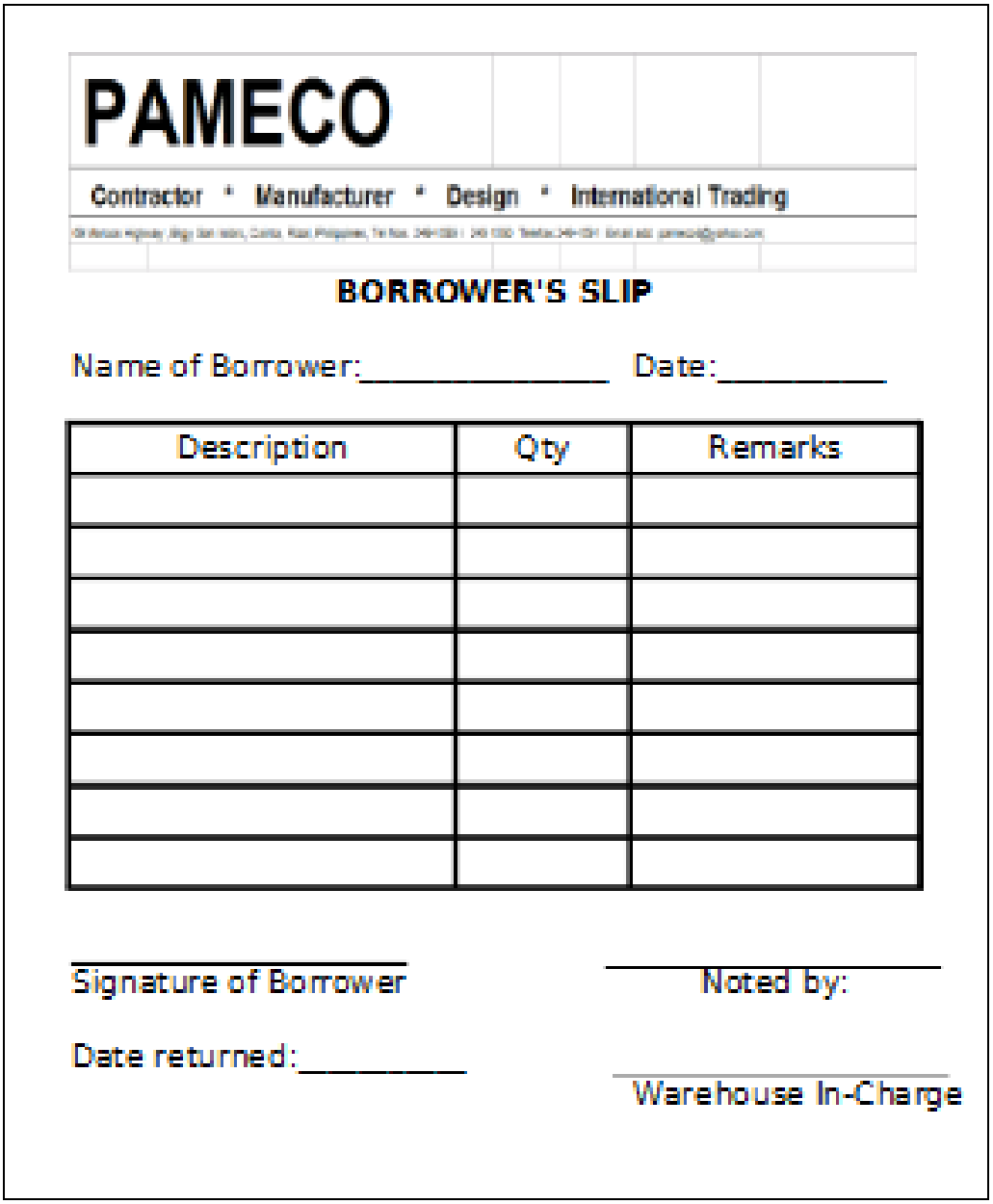
Signature of Head of the Department: _____

Signature of Stores Manager: _____

Received By: _____ Date: _____ Time: _____

**Borrower's Slip**

This form is used for borrowing materials, tools, equipment. Its use promotes proper monitoring of inventories. It has numerous purposes and outweighs disadvantages. This form is devised according to the need of the office or accountable officer. Adopting this system necessitates observing certain rules and penalties for violators.



PAMECO

Contractor * Manufacturer * Design * International Trading

BORROWER'S SLIP

Name of Borrower:_____ Date:_____

| Description | Qty | Remarks |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

_____ _____

Signature of Borrower Noted by:

Date returned:_____

_____

Warehouse In-Charge

**Requisition Procedure**

In as much as some offices or school shops do not use the electronic method, requisition is made on a prepared slip available for use. Properly completed Requisition Form is an important step in efficiently securing your order; otherwise expect delays in the processing and approval of your requisition. The requisitioning process is done by an authorized person.

1. Accomplish the slip with the required data.
2. Have it approved or signed by your supply officer or immediate supervisor.
3. Forward the slip to the section unit officer in charge of purchases, procurement, or preparation and release of requisitioned items.

# How Much Have You Learned?

**Self-Check 2.1**

Direction: This part checks whether you have learned the required competencies for this particular module. Encircle the best answer from the choices given.

1. Which contains information about certain services required for performance?
   A. borrower's slip
   B. job order slip
   C. requisition slip
   D. borrower and job slips

2. Which specifies a demand for materials, supplies, or tools?
   A. borrower's slip
   B. job order
   C. requisition slip
   D. borrower and job slips

3. It contains an accepted form of request for tools, materials, and equipment on due time carries a provision for default.
   A. borrower's slip
   B. job order
   C. requisition slip
   D. borrower and job slips

4. Normally, how many signatories at a very least are there in the Requisition Slip?
   A. 1
   B. 2
   C. 3
   D. 4

5. Which happens when any of the slips lack necessary data?
   A. There is delay in processing.
   B. Promptness of approval is at stake
   C. Misunderstanding occurs
   D. all of the above

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Activity Sheet 2.1**

**Directions:** With your understanding and skills on job order, requisition, and borrower's slips, prepare on the space below a schematic diagram of the flow from accomplishment of the various slips to performing the services or handling of received items.

***If you were to evaluate the functionality of said diagram, what assessment criteria would you use?***

A. My Schematic Diagram:
B. My Assessment Criteria:

# How Do You Extend Your Learning?

**Assignment Sheet 2.1**

**Directions:** With the information and form samples on hand from the different offices and factories you visited, make your own job order, requisition, and borrower's slips based on your need. Be sure that your slip conforms with certain standards such as:

1. Contains needed data.
2. Easy to understand.
3. Easy to use.
4. Complete in itself and in form.

Submit the three different outputs with brief justification each to your teacher.

# LEARNING OUTCOME 3

**Receive and inspect materials**

## PERFORMANCE STANDARDS

- Materials and tools are received and inspected as per quantity and specification based on requisition.
- Tools and materials are checked for damages and manufacturing defects.
- Materials and tools received are handled with appropriate safety devices.
  Materials and tools are set aside in appropriate location nearest to the workplace.

## What Do You Already Know?

**Let us determine how much you already know about receiving and inspecting materials. Take this test.**

**Pretest LO 3**

**Directions:** Encircle the best answer from the choices given.

1. What is the importance of material management?
   A. It provides the best service to the clientele
   B. It maximizes efficiency
   C. It helps in monitoring and managing inventories
   D. All of the above.

2. What happens when the employees are not informed of the Receiving Procedure?
   A. Productivity and efficiency of the company's employees are affected.
   B. Wastage of resources is evident.
   C. Misunderstanding among and between employees occurs.
   D. All of the above.

3. Which ensures correctness of deliveries or performance of services?
   A. Requisition procedure
   B. Receiving procedure
   C. Inspection procedure
   D. Delivery Procedure

4. Which procedure generally finds out inconsistency in the required specifications of materials, tools, and equipment?
   A. Requisition procedure
   B. Receiving procedure
   C. Inspection procedure
   D. Handling procedure

5. Which shows proper carrying and safekeeping of items?
   A. Requisition procedure
   B. Receiving procedure
   C. Inspection procedure
   D. Handling procedure

# What Do You Need To Know?

**Read Information Sheet 3.1 very well then find out how much you can remember and how much you learned by doing Self-check 3.1.**

**Information Sheet 3.1**

## MATERIAL MANAGEMENT

Effective material management is very essential in many ways for the company or office: First, it provides the best service to the clientele; second, it maximizes efficiency; and, third, it helps in monitoring and managing inventories.

### Receiving Procedure

Procedure for receiving requisitions varies in every office, school, and shop. Offices make it a point that everything is in the proper order and perspective to ensure effectiveness and efficiency. However, it is a must that everybody in the company especially the concerned employees are well-acquainted of the process to avoid or at least minimize waste of resources which is very significant to the company's success.

RECEIVING GUIDELINES MATRIX (WEB VERSION)

| Merchandise is... | Central Receiving Department / Fiscal Office | Requisitioning Department | Accounts Payable |
|---|---|---|---|

**Purpose:** The purpose of this matrix is to provide guidance to those personnel involved with receiving or accepting goods and materials on behalf of the Maricopa Community College District. Best business practices support that receiving be completed through a centralized function and location. Such guidance helps ensure that the following "Key Control Objectives" and "Process Attributes" are achieved.

- Goods are purchased only with proper authorization.
  - Goods compared to purchase orders or other purchase authorization before acceptance.
  - Unmatched receivers investigated; Unauthorized items identified for return to vendor.
  - Receipts under blanket purchase orders monitored; Quantities exceeding authorized total returned to vendor.
- Goods received are recorded correctly as to account, amount, and period.
  - Goods counted, inspected and compared to packing slips before acceptance.
  - Receiving reports issued by receiving/ inspection department in pre-numbered order.
  - Receiving documentation, purchase order, and invoice matched before recording liability.

*This matrix serves to provide guidelines in which the order of steps completed may vary depending on college and circumstances.*

**Goods POs/LPOs – Non-Capital**

| | | | |
|---|---|---|---|
| • **Non-capital** and delivered to Central Receiving Department. | • Inspect for proper addressing before acceptance.<br>• Inspect for proper number of packages agrees to delivery document before acceptance.<br>• Inspect for obvious damage before acceptance.<br>• Agree supporting documentation (packing slip/invoice) to existing PO/LPO.<br>• Receive merchandise on-line in CFS.<br>• Deliver merchandise to Requisitioning Department. Obtain signature from Requisitioning Department on original supporting documentation (packing slip/invoice) or Delivery Log Sheet.<br>• Make copy(ies) of signed packing slip/invoice (Central Receiving Department & Requisitioning Department).<br>• If invoice enclosed with shipment, forward original to Accounts Payable. Maintain original packing slip with hard-copy PO/LPO. | • Sign original supporting documentation (packing slip/invoice) or Delivery Log Sheet indicating physical receipt of goods within department.<br>• Inspect merchandise for quality and concealed damage.<br>• Notify vendor and/or Central Receiving Department, as appropriate, of concealed damage, overshipments, or merchandise received but not ordered. | • If invoice received directly from vendor, it is entered into CFS and maintained in A/P Department awaiting on-line receiving.<br>• Pay vendor upon 3-way match of on-line PO, Invoice, and on-line Receiver. |

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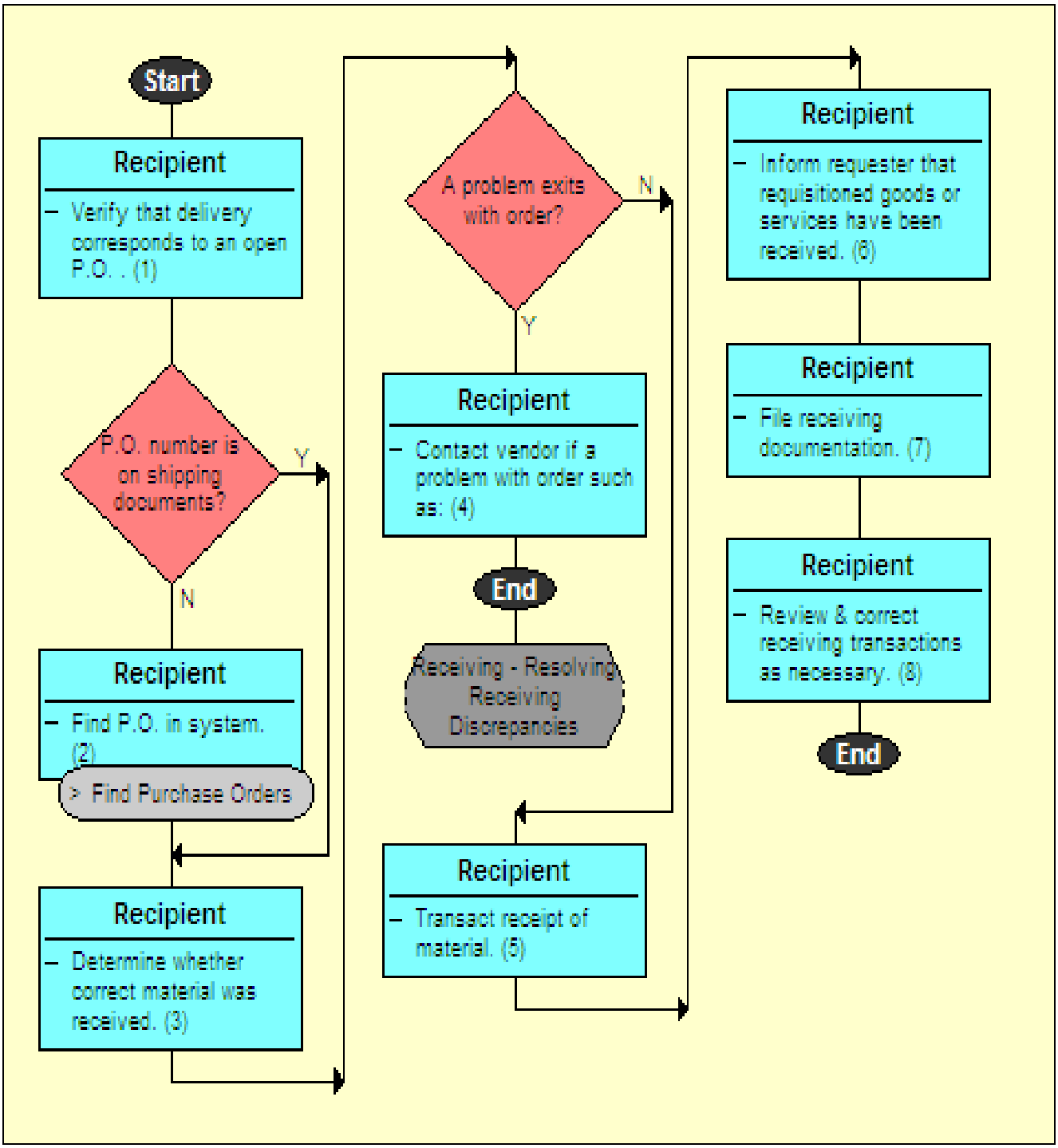


Fig. 2. Receiving Procedure Flow Chart

**Quality Inspection and Procedure**

Delivered or issued items should be properly inspected for accuracy in terms of quality, specifications, quantity, and functionality or workability. The act which involves monitoring, observing or testing, usually involving product sampling, to insure compliance with the requirements is known as quality inspection. It includes activities such as collecting data from the item or items to ensure quality and preciseness.

Once quality inspection has been done, the receiver signs a paper or form to attest to the completeness and compliance with the requisition; otherwise, he is obliged to make a report of his inspection findings to persons or authorities concerned for appropriate action.

**Materials Handling**

Materials handling operations are carried out in most offices or plants. Each handling task poses unique demands on the worker. However, work places can help workers to perform these tasks safely and easily by implementing and upholding proper policies and procedures. For Industrial plants, regulations under Industrial Establishments (O. Reg. 851/90) made under the Occupational Health and Safety Act should be properly observed.

1. ***Hazards***. To assess the hazards of manual material handling operations, consider the load, the task, the environment in which the task is performed, and the operator. When these factors interact with each other, they can create hazards that result in injuries. A load may be hazardous because of:

    a. Weight
    b. Size
    c. shape (making it awkward to handle)
    d. coupling (type of grip on the load)
    e. slippery or damaged surfaces
    f. absent or inappropriate handles, and
    g. imbalance (i.e., changing centre of gravity)

    The task or method of handling may be hazardous when it involves:

    a. lifting or lowering
        - repetitively
        - quickly
        - for extended periods of time
        - while seated or kneeling
        - immediately after prolonged flexion
        - shortly after a period of rest

    b. an inability to get close to the load

    c. moving the load over large distances

    d. accuracy and precision required because of
        - fragile loads, or
        - specific unloading locations

    e. materials positioned too low or too high

    f. hazardous movements or postures (e.g. twisting, extended bending and reaching)

    g. multiple handling requirements (e.g., lifting, carrying, unloading)

2. ***Control Measures***. The best control measure is to eliminate the need for workers to perform manual handling tasks. Since this is not always possible, design manual handling tasks so that they are within the workers' capabilities. Considerations include the load itself, the design of the workstation and work practices. Providing mechanical handling devices or aids can often eliminate the task itself or ease the demands on the worker.

3. ***Training***. Traditional training has focused on proper lifting methods and safe work procedures. More recently, workplaces have introduced fitness and back education approaches. In combination with job and workplace design changes, these approaches are effective in preventing accidents and injuries. On the job demonstrations and practice sessions are the best methods of training. Cover basic manual materials handling procedures, and the proper use of mechanical aids and techniques. Regularly reinforce the proper techniques to ensure their continued use. The objectives of material handling training are to teach the worker:

    1. How to identify hazardous loads or handling tasks
    2. The proper selection and use of mechanical handling aids
    3. Safe postures and manual lifting techniques to minimize strain
    4. Safe lifting techniques

# How Much Have You Learned?

**Self-Check 3.1**

**Directions:** This part checks whether you have learned the required competencies for this particular module. Simply encircle the best answer from the choices given.

1. What is the importance of material management?
    A. It provides the best service to the clientele.
    B. It maximizes efficiency.
    C. It helps in monitoring and managing inventories.
    D. All of the above.

2. What happens when the employees are not informed of the Receiving Procedure?
    A. Productivity and efficiency of the company's employees are affected.
    B. Wastage of resources is evident.
    C. Misunderstanding among and between employees occurs.
    D. All of the above

3. Which ensures correctness of deliveries or performance of services?
    A. Requisition procedure
    B. Receiving procedure
    C. Inspection procedure
    D. Handling Procedure

4. Which procedure that generally finds out inconsistency in the required specifications of materials, tools, and equipment?
    A. Requisition procedure
    B. Receiving procedure
    C. Inspection procedure
    D. Handling procedure

5. Which shows proper carrying and safekeeping of items?
    A. Requisition procedure
    B. Receiving Procedure
    C. Inspection procedure
    D. Handling procedure

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 3.1**

**Directions:** Draw your own schematic diagram for each of the procedures on receiving, inspecting, and handling of materials, tools, and equipment. Prepare them on three different sheets of short size bond paper.

# How Do You Extend Your Learning?

**Assignment Sheet 3.1**

**Directions:** Visit some offices, shops, or factories in the locality. Find out and record their procedures in receiving, inspecting, and handling of materials, tools, and equipment. Then, prepare a report of your observation for submission to your teacher.

**Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!**

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LESSON 2

# Practice housekeeping procedures

## LEARNING OUTCOMES:

**At the end of this Lesson, you are expected to do the following:**

**LO 1. maintain work areas, tools and equipment; and**
**LO 2. follow standard work processes and procedures.**

# Definition of Terms

**Barricades –** small structures made of metal, wood, or other possible materials which are used purposely to convey a message of caution or restriction to all concerned

**Doable** – set of best or workable shop practices in order to achieve work simplification

**First aid –** includes all forms of remedies given immediately to humans in order to minimize or prevent casualties or fatalities caused by accidents or normal course of time

**Hazard –** involves unforeseen incident that is physically unfavorable to humans or animals

**Risk management –** scientific technique of assessing, minimizing, and preventing accidents or loss of lives or limbs in the performance of tasks or jobs

**Sanitize** – maintain high standard of housekeeping

**Self-Discipline** – doing things spontaneously without being told or ordered

**Signs** – objects made by flat sheet metal or wood suspended by a stand or nailed on the post or wall which are located strategically

**Sort** – take out unnecessary items and dispose the same

**Sweep** – clean the workshop

**Symbols** – common illustrations printed on the signs which sometimes carry a descriptive word or few words

**Systematize** – arrange necessary items in good order for use

**Work simplification** – application of workable principles that increases the awareness and ability of the workers to be more productive and efficient without compromising their safety and the product quality

# LEARNING OUTCOME 1

**Maintain cleanliness in work areas, tools and equipment and Occupational Safety**

## PERFORMANCE STANDARDS

- The basic procedures of 5S are demonstrated in the workplace.
- Removing and disposing of unnecessary items according to company or office procedures are followed.
- Reusable and recyclable materials are sorted according to company/ office procedures.
- Items are arranged in accordance with company/office housekeeping procedures.

## What Do You Already Know?

**Let us determine how much you already know about maintaining cleanliness in work areas, tools and equipment. Take this test.**

**Pretest LO 1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Who introduced the 5Ss principle?
   A. English
   B. Filipinos
   C. Japanese
   D. Japan

2. Which of the following are the 5Ss?
   A. Seiri, Seiton,Sweep, Seiketsu Shitzu
   B. Seiri, Seiton, Seiso, Sanitize, Shitzu
   C. Sort, Seiton, Sweep, Seiketsu, Shitzu
   D. Seiri, Systematize, Seiso, Seiketsu, Shitsu

3. It refers to the cleaning of workshop.
   A. Seiton
   B. Seiri
   C. Seiso
   D. Seiketsu

4. It is the condition to maintain high standard of good housekeeping where there is no dust and rust anywhere.
   A. Sort
   B. Systematize
   C. Sweep
   D. Sanitize

5. Which is practiced when your colleagues decide with you which things should be kept considering the flow of your work?
   A. Sort
   B. Systematize
   C. Sweep
   D. Sanitize

6. Its advantage is to promote camaraderie among workers in the company.
   A. Shitsuke
   B. Seiton
   C. The 5Ss
   D. Systematize

7. It ensures the safety of the construction workers.
   A. Signs, Signal & Barricades
   B. Danger Signs
   C. Exit Signs
   D. Safety Instructions Signs

8. Which shall be used when an immediate hazard exists?
   A. Signs, Signal & Barricades
   B. Danger Signs
   C. Exit Signs
   D. Safety Instructions Signs

9. Which shall be used as temporary means of warning an existing hazard such as defective tools and equipment?
   A. Danger Signs
   B. Accidental Prevention Tags
   C. Traffic Signs
   D. Directional Signs

10. Which is a major factor for the prevention of shop accidents?
   A. Signs, symbols, barricades
   B. The 5Ss Principle
   C. Attitude
   D. Systematize

# What Do You Need To Know?

**Read Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.**

**Information Sheet 1.1**

## THE WORKING STATION

**The 5S**

The 5Ss are Japanese words that start with letter S. But in the Philippines, some thought of 5 English words that all begin with letter S which is equivalent to these Japanese words. Therefore, it is necessary to remember the Japanese' 5S. What is important aside from retaining this into our minds is to make it part of our daily habit.

Below are the 5Ss and their English equivalent:

| Japanese | English | Brief Explanation |
|---|---|---|
| SEIRI | SORT | Take out unnecessary items and dispose |
| SEITON | SYSTEMATIZE | Arrange necessary items in good order for use |
| SEISO | SWEEP | Clean your workshop |
| SEIKETSU | SANITIZE | Maintain high standard of housekeeping |
| SHITSU | SELF-DISCIPLINE | Do things spontaneously without being told or ordered |

5Ss is not simply a list of action items. It is an integrated concept of action, condition and culture. The nature and implication of each S needs to be understood as follows:

1. **SEIRI** (SORT) means "take out unnecessary items and dispose'

   **Step 1** – Look around your workplace with your colleagues. Discover and identify items which are unnecessary to your work. Then, dispose all unnecessary items. **NEVER KEEP ANYTHING WHICH IS UNNECESSARY TO YOUR WORK.**

   **Step 2** – If you and your colleagues cannot decide whether an item is necessary or not, put **DISPOSAL NOTICE** with the data on the item and set item aside.

   **Step 3** – After a period, say two months, check if someone has the item or not. If no one needed the item, that means the item is not needed for your work.

**Note:** Disposal can be done in either of the following ways:
1. Sell it to outside of the company.
2. Move to other department /section where the item is needed.
3. Throw it away, dispose as garbage.
4. In disposing the belongings of the company, it is better to make people know who has the authority for disposal.

5. It is also better to make people know where to return excessive stock of materials and supplies.
6. While looking around for unnecessary items in your workplace, look at every nook. It will be a bonus to you if you found some useful items.

2. **SEITON** (SYSTEMATIZE) means “Arrange necessary items in good order to use”

**Step 1 –** Make sure that all unnecessary items are eliminated from your workplace.

**Step 2** – Decide with your colleagues which things to put where taking into account the flow of your work. The principle is to put most frequently needed items close to the user so as to minimize the movement of the person. Things which are not so often used could not be placed slightly further away.

**Step 3** – It is necessary to make sure that everyone at your workplace knows what is kept for efficient use. Make a list of things with location and put it in a locker or cabinet. Label each drawer/cabinet to show what is kept inside.

**Note:** The object of SEITON (SYSTEMATIZED) is to make your workplace a safe and efficient place to work in.

3. **SEISO** (SWEEP) means “Clean your workplace”. There is a very strong correlation between quality of products and cleanliness of the workplace where products are manufactured. Accordingly, SEISO (SWEEP) should be practiced every day, and sometimes, even during the day.

The following are suggested for your SEISO (SWEEP) operation:

- Do not wait until things get dirty. Clean your workplace, including machines, equipment, tools and furniture regularly so that they do not have chance to get dirty.
- Put things inside for 3 minutes every day.
- You and your colleagues should be responsible for the dirty works around you. The janitors or sweepers will look after the common areas only.
- Never throw anything and make it your habit.
- Cleaning is also checking.

4. **SEIKETSU** (SANITIZE) means” Maintain high standard of housekeeping”. So as not to waste your effort, do not stop after implementing initial 3Ss.

The following are suggested for your SEIKETSU (SANITIZE) operation:

- Create a maintenance system for housekeeping. Make a schedule of cleaning for your workplace.
- Interdepartmental competition is a very effective means of sustaining and enhancing people’s interest on 5Ss.

**Note:**

1. Indicate the names of the persons responsible for the work area and for the machine.
2. Regular inspection and evaluation on the level of 4Ss by each work are necessary.

3. Do not criticize poor cases, but also praise and commend good practices or good performances.

5. **SHITSUKE** (SELF-DISCIPLINE) means “Do things spontaneously without being told or ordered.” It is to make every one practice 4Ss spontaneously and willingly as habit or way of life. There is no other way to foster such culture than practicing 4Ss regularly until such time when everyone becomes fond of 5Ss.

   To help such corporate culture conducive to 5Ss, the following need to be emphasized:
   - Treat your workplace as your own home.
   - You are spending most of your WAKING TIME at your workplace than at home.
   - Your workplace is an important place where to make income for yourself and your family.
   - Make your workplace as clean and comfortable as your home.

   **Note:**
   In enhancing SHITSUKE (SELF-DISCIPLINE) of employees of a company, the rules of management are very important. People with managerial duties should be worthy of respect and emulation.

What can an individual gain from the 5Ss?

1. ***The 5Ss makes your workplace more pleasant***. In practicing 5Ss, you have to start from discussing and agreeing what to put for efficient use by everyone. With your colleagues, you have to clean the workplace. Such human relation and working environment will make you and your workplace pleasant.

2. ***The 5Ss makes your work more efficient***. If you have to look for something and take so much time finding it, you are not only wasting your time but also wasting your energy and moral.

   On the other hand, if everything at your workplace is arranged in proper order and readily available for use, your work flow will always be very smooth. It improves not only your efficiency but also improves the rhythm of your work and the more you will enjoy it. If you have a work , better to enjoy it.

3. ***The 5Ss improves your safety***. A clear and tidy working environment where everything is properly placed, where clear instructions are readily available, and where no one throws anything is safer place to work in. Practicing 5Ss improves your own safety. You can enjoy your work more with less risk.

4. ***The 5Ss improves quality of your work and your products***. People affect environment. On the other hand, the environment also affects people. If you are accustomed to work in a clear and tidy environment, you can develop your sensitivity so that you can feel and identify any defect in work.

   On the contrary, messy and untidy environment will adversely affect your sensitivity. Therefore, good environment will improve the quality of your work. It is quite natural that quality products come only from clean and well- organized workplace.

5. ***The 5Ss makes a quality life of people***. The process of 5Ss requires people to think, consult and agree with others and cooperate with each other.

   At the same time, practicing the 5Ss gives people satisfaction of being creative, friendly with others and seeing chances better.

**In summary:**

- 5Ss improves CREATIVITY of people
- 5Ss improves COMMUNICATION
- 5Ss improves HUMAN RELATION among people
- 5Ss enhances COMRADERSHIP among people
- 5Ss gives VITALITY to people

Vitality of the people is the locomotion to move the company forward.

## SIGNS, SIGNALS AND BARRICADES

Signs, signals and barricades are important for the safety of the construction workers. Signs and symbols should be visible at all times when work is being performed, and shall be removed or covered promptly when the hazard does not exist anymore.

**I. Danger Signs.** Danger signs shall be used only where an immediate hazard exists.

Danger signs should be read as the predominating color for the upper panel; outline on the borders; and a white lower panel for additional sign wording.

**II. Caution Signs.** Caution signs shall be used only to warn against or caution against practices.

Caution sign shall have yellow as the predominating color; black upper panel and borders; yellow lettering of "caution" on the black panel; and the lower yellow panel for the additional sign wording. Black lettering shall be used for additional wording.

Standard color of the background shall be yellow; and the panel, black with yellow letters. Any letter used against the yellow background shall be black. The colors shall be those of opaque glossy samples.

**III. Exit Signs.** Exit signs, when required, shall be lettered in legible red letters, not less than 6 inches high, on a white field and the principal stroke of the letters shall be at least three-fourths in width.

**IV. Safety Instructions Signs.** Safety instruction signs, when used, shall be with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background.

**V. Directional Signs**. Directional signs, other than automotive traffic signs specified in the paragraph below, shall be white with a black panel and white directional symbol. Any wording on the sign shall be black letters on the white background.

**VI. Traffic Signs.** Construction areas shall be posted with legible traffic signs at point hazard. All traffic control signs or devices used for protection of construction workers shall conform to Occupational Safety and Health Administration (OSHA) standards.

**VII. Accident Prevention Tags.** Accident prevention tags shall be used as temporary means of warning of an existing hazard such as defected tools, equipments, etc. They shall not be used in place of, or as a substitute for, accident prevention signs. Specifications for accident prevention tags similar as shown below shall apply.

## VIII. Signaling Sings and Barricades

1. **Flagmen.** Hand signaling by flagmen shall use red flags, at least 18 inches square or sign paddles, and in periods of darkness, red lights. Flagmen shall be provided with and shall wear a red or orange garment while flagging. Warning garments worn at night shall be of reflectorized material.

2. **Barricades.** Barricades for protection of employees shall conform to the OSHA standards.

# WORK SAFETY

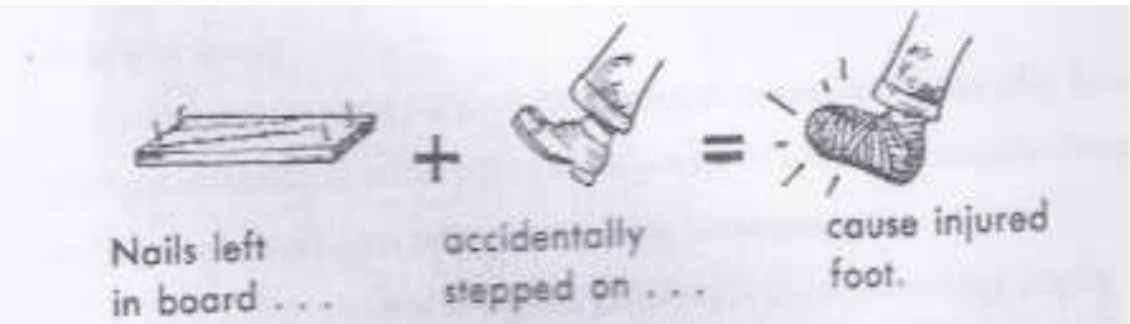
## IX. Introduction

We have heard of the slogans: "***Watch your Step!- Look before you Leap-Take it easy***!" and dozens of others which mean the same thing. We have also heard of a very important slogan "Safety First"

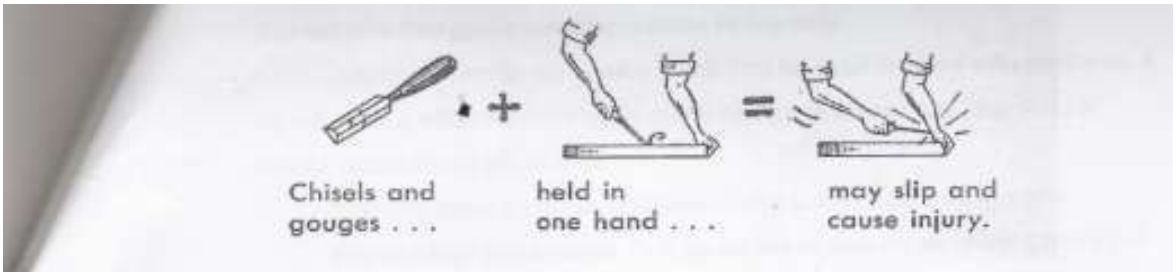
**A. Avoiding Hazard in the Shop Area.** When working in the shop, we should become acquainted with the things that may cause trouble. If we know about them, we could avoid them. Avoid hazards and treat them with respect. Hand tools and power tools are accounted for many shop accidents that could be prevented easily.

**B. Attitude.** Carelessness is caused by a poor working attitude. Your carelessness can cause injury to you or cause accident to someone else. Be aware that only proper conduct and good working attitude can prevent accident. Thinking about safety reduces carelessness.

Keep your work area clear of unnecessary tools and other parts which are not needed in your work. It is not a good thing to let the shop floor become strewed with scraps and debris. Under such conditions the worker may slip and fall.



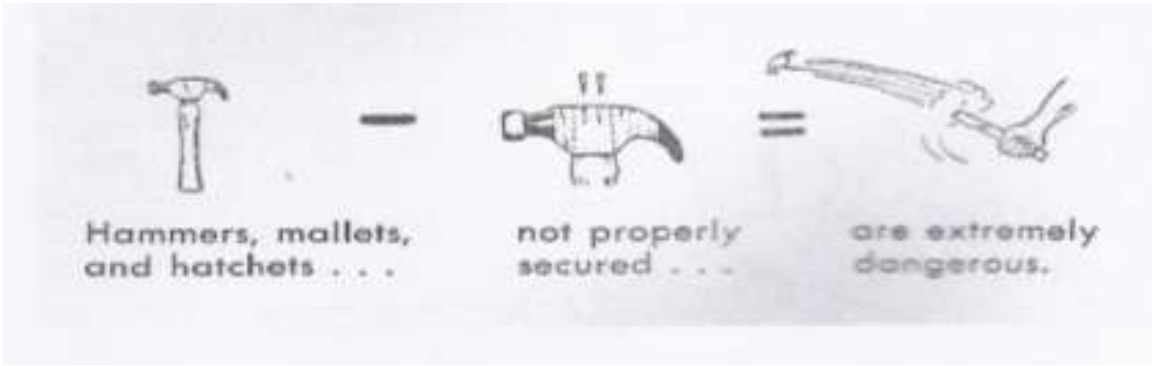
If nails are removed from boards, the unwary may step on them. Do not leave boards lying around that have nail points sticking out beyond the surface.




Chisels are dangerous if not properly handled. The workers should always take care to use the chisel in such a way that the cutting is performed in the direction away form the parts of his body. Clamping the stock firmly in place and using two hands to operate a chisel obviously eliminate the danger of cutting the hand which might otherwise be used as the holding agent.

When handling a sharp tool to another person, extend the handle first. This shows both courtesy and sound practice toward accident prevention.

Use the proper tool for the right job. The wrong tool can cause personal injury or damage the part. Do not place sharp tools in your pocket. Sharp tools will cut or stab into your skin. Be sure that your tools are in good condition. There is always danger with heads of hammers, mallet and hatchets if not properly attached will fly out and seriously injure someone.




## II. Safety While Working

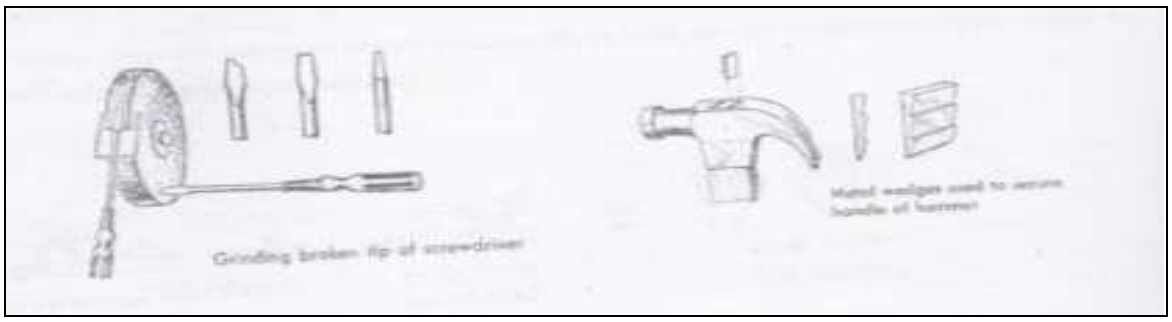
Work carefully and give your job complete attention. Be concerned with personal safety. Know shop layout and the location of safety devices, including fire exits and fire extinguisher. Protect yourself by wearing the proper clothes and proper safety devices.

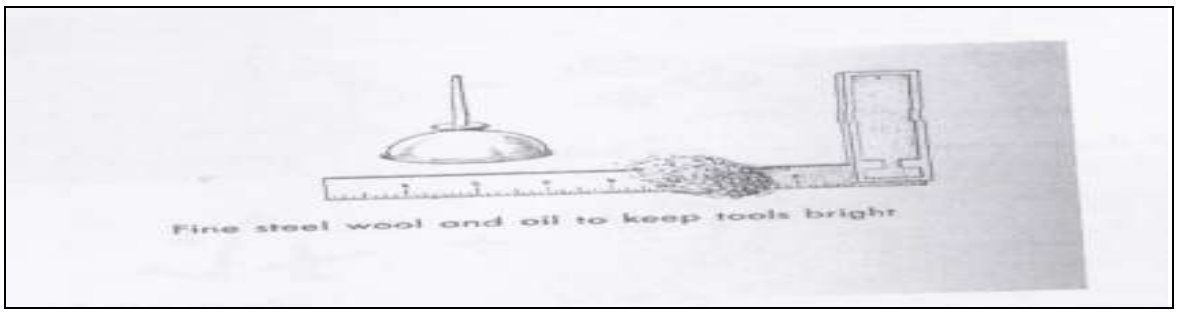
Loose clothing can catch on moving parts and can result in serious personal injury. Dangling sleeves and shirttails should not be worn. Keep long sleeves buttoned and shirttail tucked in.

Wear full leather shoes with non-skid and soles to protect your feet and to prevent from slipping. Steel-toed safety shoes provide the best protection for shop work.

Long hair and jewelry are hazards also. Long hair should be covered with a brimless cap. A cap with a brim, as well as long hair, is caught easily in moving parts and machinery. Rings should be removed, because they can get caught.

Wear safety glasses or a face shield whenever working on where particles can fly around. Keep handling tools in good conditions. Tools that may slip can cause cuts and bruises. A good grip on tools also prevents personal injury and damage. Wipe excessive dirt from hands and tools. Wrong tool can damage parts, the tool itself. Do not use broken or bent tools.

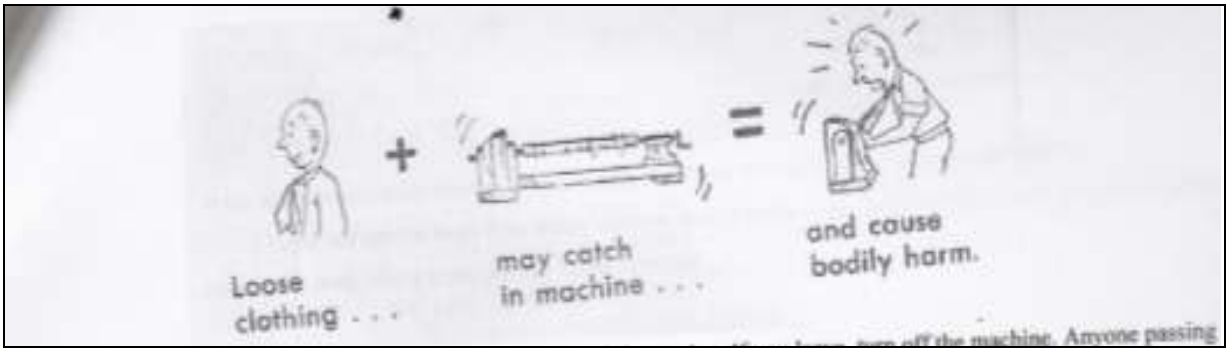




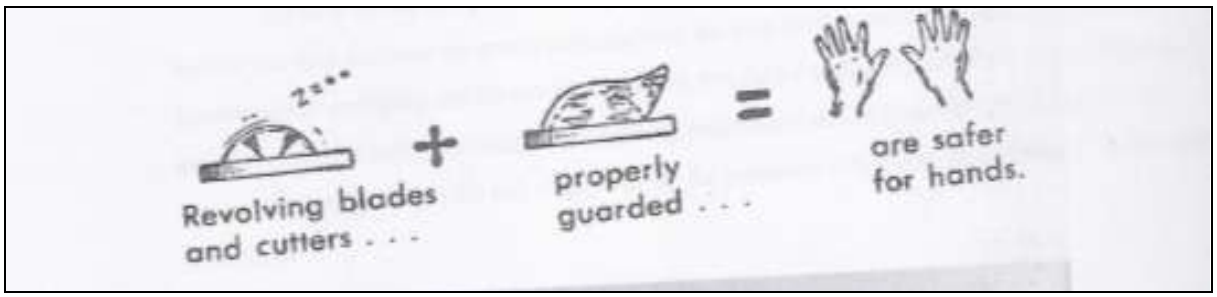

Be careful when using sharp or pointed tools that can slip and cause injury. If a tool is to be sharpened, make sure it is sharp. Dull tools can be more dangerous than sharp tools.

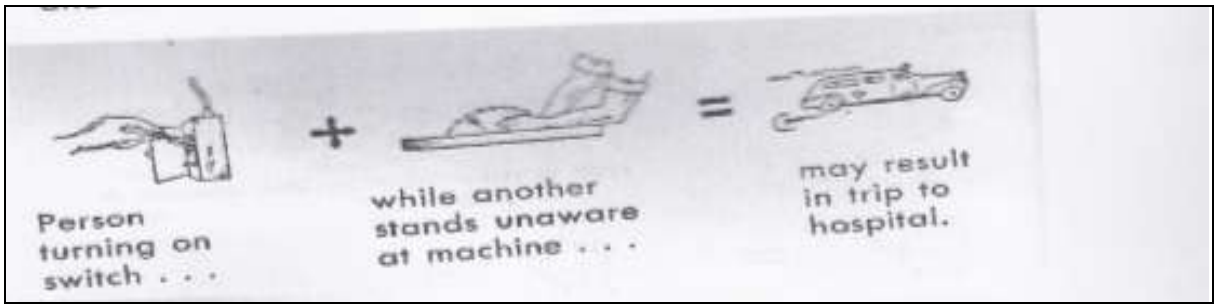
Do not use a power tool without permission from your teacher. Be sure you know how to operate the tool properly before using it. Instructions should be read carefully.

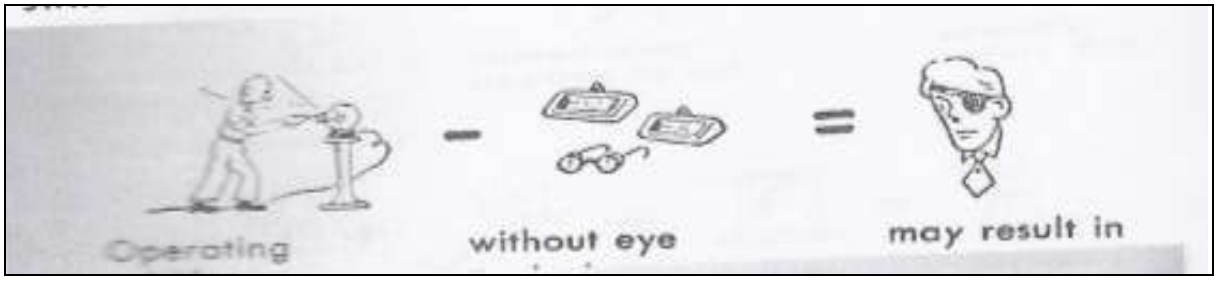
Make sure everyone and all parts are clear before starting the machines. Keep hands and clothing away from the moving parts.

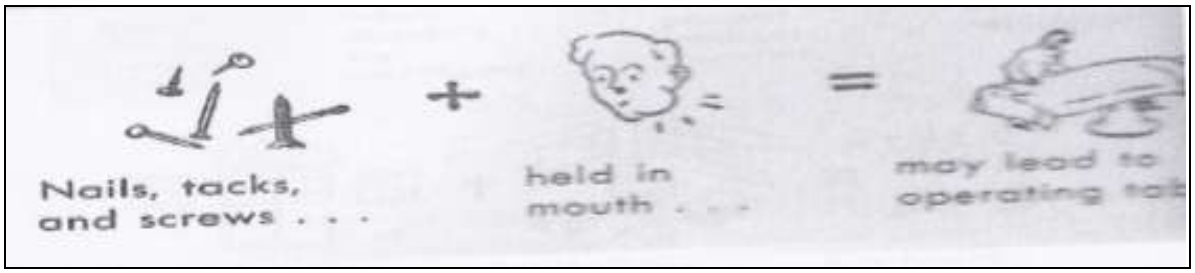


Never leave a power tool unattended when it is running. If you leave, turn off the machine. Anyone passing by an unattended machine can be hurt seriously.



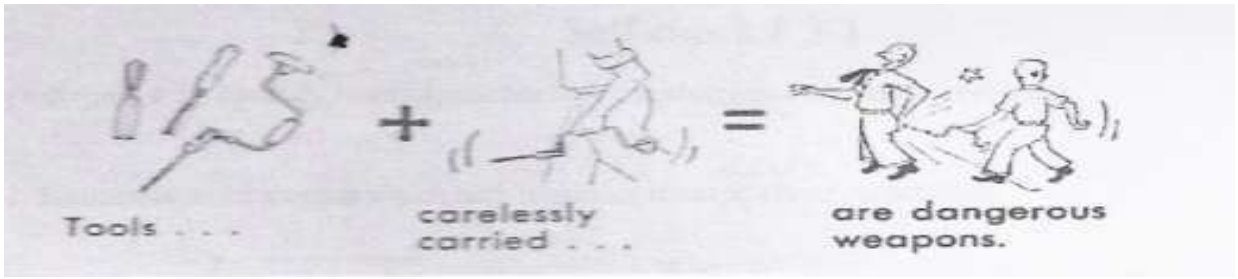



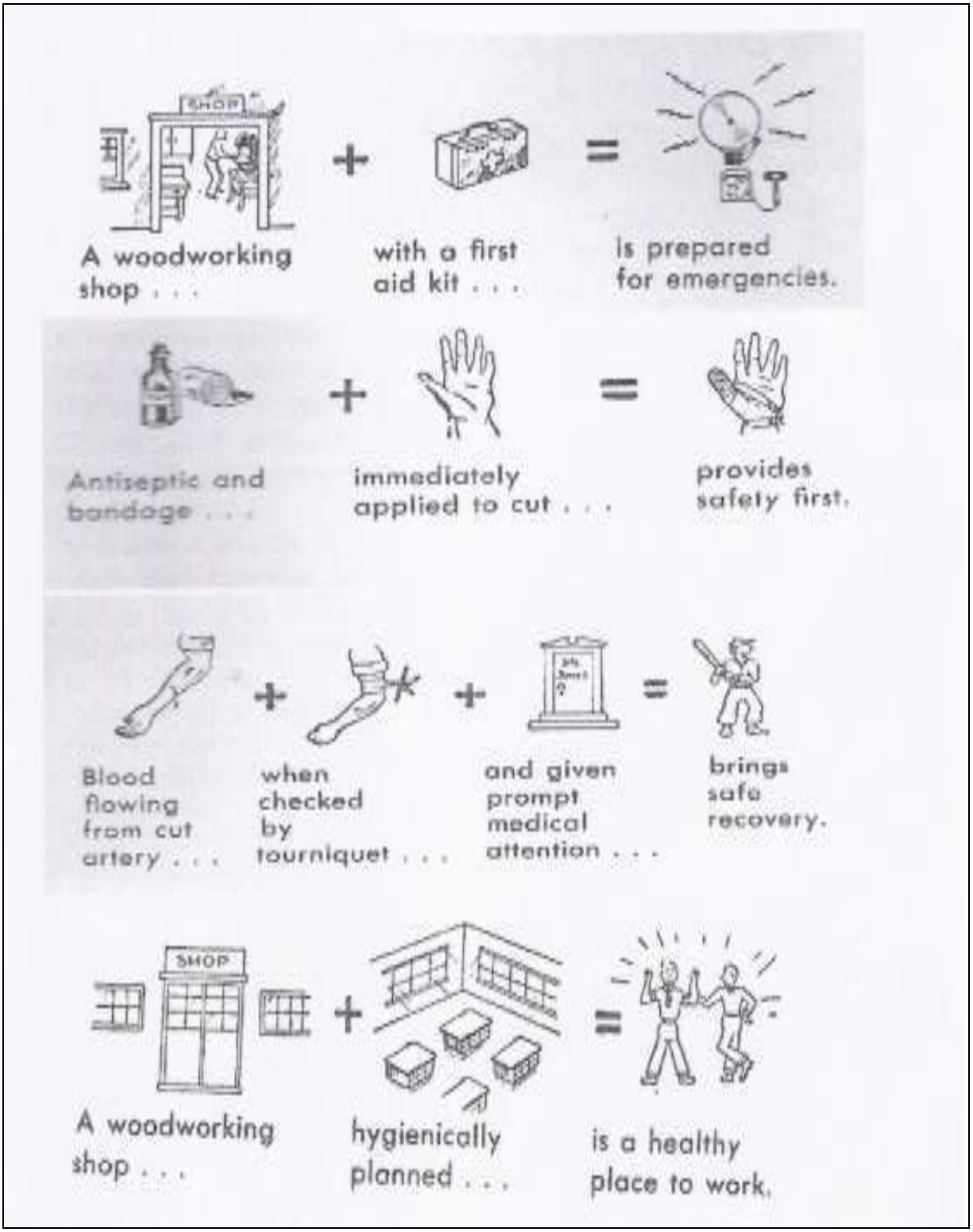

If the machine does not operate properly, turn it off and wait until it has stopped completely.

Do not enter a work area where a power tool is being used. Obey the rules outlined by your teacher. Stay away from power tools that are being operated.



## III. A Healthy Shop Is a Safe Shop

The shop should be pleasant place where you will enjoy your work. Large manufacturing companies have learned that the shop accidents are greatly reduced when the shop itself is well-lighted and well-ventilated. The introductions of ventilating and blower systems, which free the air of dust and particles of dirt, have gone a long way toward reducing accidents. Good lighting, both natural and artificial, likewise safeguards the worker. The healthy shop is a safe shop. After all, the protection of health is the first rule of “Safety First in the Shop”.



## IV. First Aid.

First aid is very important to an injury or accident. It will prevent death of an injured person, save much blood from flowing, and prolong the victim's life.

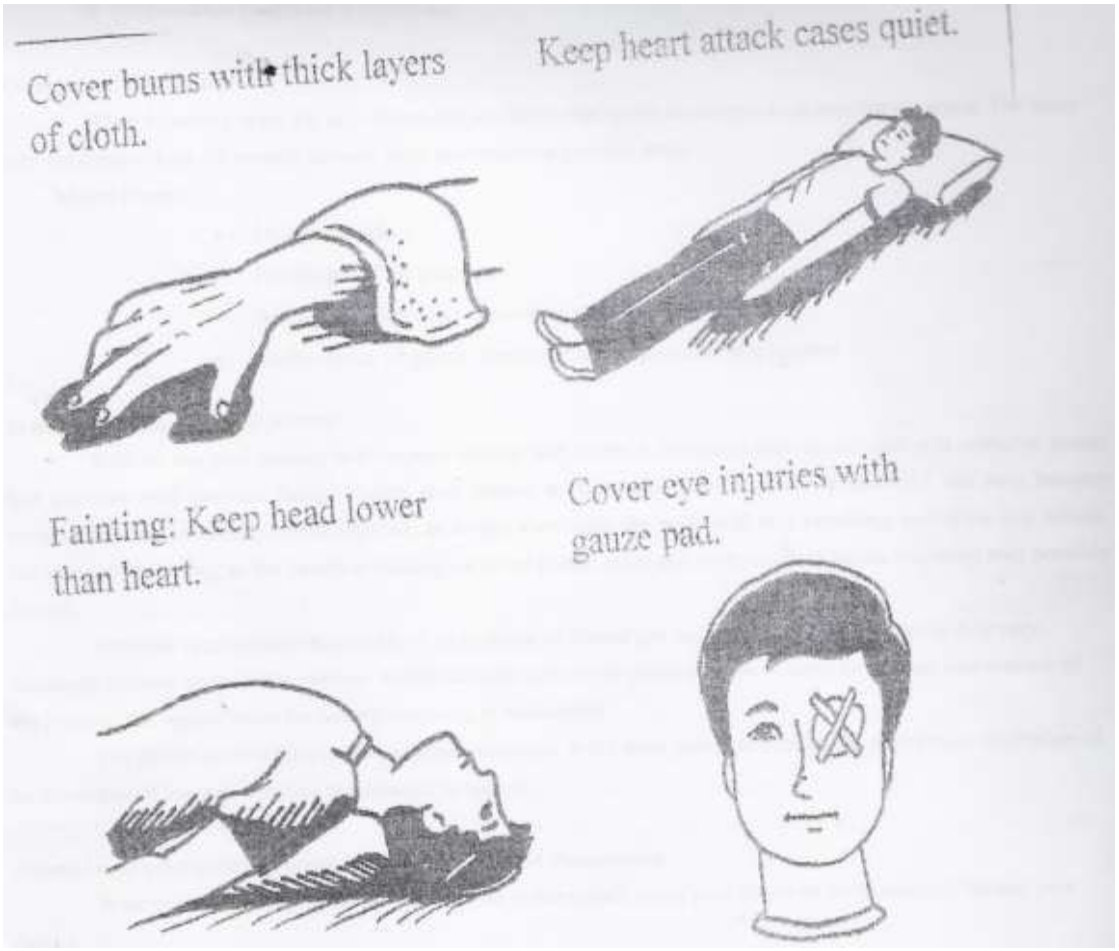
Many accidents happen and death occurs due to human error and carelessness. These factors or causes of death can be positively prevented by safety education and first aid training. This will result in less accident or may prevent accidents or death. The rule states that in helping the victim of an accident, the rescuer should proceed from the most fatal to the least injuries. The inspection of injured persons should be quickly and accurately done to save the life of the victim.

The Hierarchy of Seven Bases of Inspection in Case of Accident:

- Profuse bleeding
- Cassation of breathing
- Internal poisoning
- Shock after an injury
- Burns
- Fractures
- Dislocations, sprains, and strains

**A. General Rules /Procedure of Giving First Aid.** Principles are rules of right conduct in the performance of certain tasks. Simply, principles are guides to follow.

1. Remember that you are a first aider.
2. Send for medical help immediately when necessary.
3. Keep calm.
4. Do first things first.
5. Expect the worst. Protect the condition.
6. Keep the victim quiet and comfortable.
7. Check for bleeding, breathing, poisoning, fractures and dislocation.
8. Keep victim warm.
9. Never give water or food to the unconscious.
10. Give water-never alcohol.
11. Keep onlookers away.
12. Never waste time.
13. Loosen tight clothing.
14. Splint fractures and dislocation
15. Protect victim from vomiting and other secretions by turning head sideways.
16. Don't be in a hurry when moving victims.
17. Reassure the victim. Keep him cheerful.
18. Don't let the victim see the injury to avoid shock.
19. Don't touch wounds with hands or mouth.
20. Notify parents or relatives of the injured.




**B. Poisoning.** When strong chemicals like insecticides have been swallowed, medical assistance should be sought immediately.

**1. Ingesting a strong chemical**

What to do:

a. Give first aid to neutralize the poison such as carbonate soda, milk or raw eggs, flour diluted in water or baking soda or food oil.
b. Seek medical assistance immediately.

**2. Ingesting alkaline (ammonia)**

What to do:

a. Give vinegar and water or calamansi juice
b. Seek medical assistance immediately

**C. Cessation of Breathing.** When breathing stops for any reason, the condition that arises is referred to as respiratory arrest. The heart may continue to beat for several minutes after the breathing process stops.

Major:

1. Heart Attack
2. Blockage of air passage
3. Accidents involving drowning and electrocution
4. Suffocation of gases, smoke and compression depressant

**Symptoms of Respiratory Arrest**

1. Without oxygen, breaths will become shorter and faster, a headache may occur, ears will probably pound and memory will become fuzzy.
2. Victim may appear to be under the influence of alcohol. He may become unconscious and breathing maybe arrested.
3. In a very short time heart will stop breathing and death will follow. But remember, as long as the heart is beating, or if the heart stops and starts breathing again, breathing may possibly resume.

Artificial respiration can save life if an accident or illness has caused cessation of breathing. It is very necessary because breathing can resume. Artificial respiration is the procedure for causing air to flow into and out of the lungs of the person.

The mouth to mouth (or mouth to nose) technique is the most practical method for emergency ventilation of an individual of any age who has cessation of breathing.

**Mouth-to-mouth (mouth to nose) method of Artificial Respiration**

1. Wipe out quickly any visible foreign matter in the mouth using finger or cloth wrapped around your fingers.
2. Tilt head back so that the chin tilts pointing upward.
3. Pull or push jaw into jutting out poison. This maneuver should relieve obstructions of the airway by moving the base of the tongue away from the back of the throat.

**D. Sprain** occurs when trauma such as violent twist or stretch causes the joints to move outside its normal range of movement and ligaments are torn. Sprains are common to ankle and wrist. Allow the sprain to be fully mended because a second or third sprain may worst.

The usual symptoms of sprain are:

1. Pain and tenderness in affected area
2. Rapid swelling, sometimes with dislocation of the skin
3. Impaired joint function

An emergency approach for minor sprains is called PRICE, which means:

1. **PROTECTION -** Immobilize affected area and prevent further injury using elastic wraps, slings, splints, crutches or cane if necessary.
2. **REST -** Avoid activities that can cause pain or swelling. Rest is important to hasten tissue healing.
3. **ICE -** Ice application immediately is necessary to avoid swelling, pain and muscle spasm. Re-apply the ice application for the first day or two.
4. **COMPRESSION -** Compress the injury until the swelling ceases with warps or compressive bandages.
5. **ELEVATION -** Raise the swollen arm or leg higher than heart level to reduce swelling. Usually this can be done at night time.

**E. Strains.** These are muscle injuries caused by stretching the muscles beyond a reasonable limit? Muscle fibers maybe torn from their attachment and the tendon that attached the muscle to the bone may be ruptured or even pulled loose. This happens when lifting heavy weight and when the person slips.

Signs and symptoms

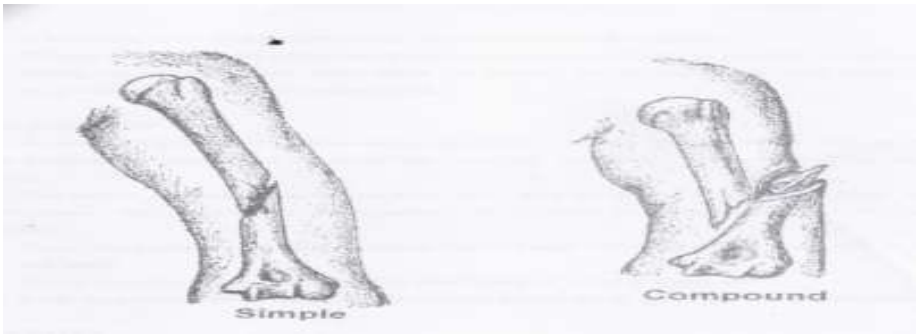
1. In localized pain, an injury occurs when allowed by tenderness and swelling in some cases

2. Stiffness and tenderness happen after 24 hours immediately after a muscle is pulled.
3. If the muscles seem not to function at all, the muscles have ruptured.

First Aid

1. Apply ice or cold pack to injured area for the first 24 hours after injury. After that, use a heating pad or hot baths.
2. If swelling is extensive, use cold packs throughout the entire recovery of a muscle injury.
3. Reduce swelling, elevate the injured muscle and use compression wraps, like bandage. Do not bind the injured part tightly.
4. Rest the injured muscle while still painful.

**F. Fracture.** Fracture is a broken bone. The common type of an adult's fracture is referred to as simple fracture with the breaks usually straight across the shaft of a big bone and no broken bone protruding. The more severe type of fracture in which the ends of the broken bone pierces the muscle and the skin is called a compound fracture. This is more serious and damaging case. Other tissues are in danger of infection.




**Caring for Fractures**

1. Apply cold cloth or an ice to the injured area to relieve pain.
2. While waiting to transport the victim, the bandaging of a compound fracture and proper splinting of the injured part are necessary.
3. If there is bleeding, cover the wound with sterile surgical dressing or clean cloth and bandage it snugly in place.
4. Avoid moving the victim more than necessary. Split and support should be applied where the injured persons lies so that when he moves, there will be no further damage.
5. Keep the victim perfectly quiet, lying on his back. Do not permit him to move, sit up or stand.
6. Turn his head slightly away from the injured side.
7. Keep the patient warm by covering him with blankets.
8. Do not give stimulants, liquor or pain killers.

## FIRST AID: EMERGENCY CASES

**A. CONVULSION /EPILEPSY**

1. Place the victim on something wide and soft such as bed or a thick rug so that he will not be injured by his involuntary motions.
2. Loosen the clothing so as to reduce the danger of choking
3. Put something blunt (such as small roll of cloth) between the victims so as told the jaws apart and thus the danger of biting his tongue.

4. Place the victim on his side rather than on his back for there is danger of vomiting and choking on the vomitus. Do not always keep his face turned to one side.
5. If breathing stops for a minute or two, administer artificial respiration.
6. If there is a high fever, reduce the body temperature as quickly as possible, wrapping the patient with a sheet wrung out of cold water. Then allow an electric fan to play the wet sheet. This will cause rapid evaporation and will have cooling effect.

**B. INTOXICATION.** Alcohol is a depressant, a slow acting anesthetic. Reflexes are slowed and muscles coordination impaired. Alcohol impairs the intellectual functions inhibitions and handicapping one in the exercise of judgment.

The deeply intoxicated person becomes pale and may break into cold sweat, may vomit, and lapse into unconsciousness. This stupor disappears in a few hours as the body gradually metabolizes the alcohol.

1. Empty the patient's stomach by helping him to vomit. Let the patient drink two or three glasses of warm salt water.
2. Give large dose (2tbsp) of crystals in a half glass of water of spoon salt.
3. Keep the patient's body warm. An intoxicated person easily chills and develops Pneumonia.

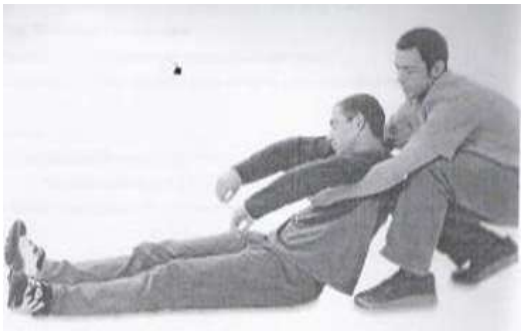
**C. SNAKE BITES**

1. Bring the victim to a hospital as soon as possible. Meanwhile, take these first measures:
    - Keep the victim from moving around.
    - Keep the victim as calm as possible, preferably lying down.
    - Immobilize the bitten extremity and keep it below the heart level.

2. If mild to moderate symptoms develop, apply a constricting band from 2-4 inches above the bite but not around a joint like elbow, knee, wrist, or trunk. The band should be form ¾ to one and one half inches wide not thin like rubber band. The band should be snug, but not loose enough to one finger underneath. Be alert to swelling; loosen the band if it becomes too tight, but do not remove it. Periodically check the pulse to ensure blood flow.

3. If severe symptoms develop, incision and suctions should be performed immediately. Apply a constricting bond and make a cut in the skin with a sharp sterilized blade though large fang mark. Cuts should be no deeper than just through the skin and should be one half long, extending over the venom deposit which is usually lower than the fang mark. Do not make cross-cut incision. Do not make cuts on the head, neck or trunk. Suction should be applied with a suction cup for 30 minutes. If a cup is not available, use the mouth. There is a little risk to the rescuer who uses his mouth, but it is recommended that the venom not be swallowed and mouth should be rinsed properly.

**Methods of Transportation**



# How Much Have You Learned?

**Self-Check 1.1**

**Directions:** This part checks whether you have learned the required competencies for this particular module. Simply encircle the best answer from the choices given.

1. Who introduced the 5Ss principle?
   A. English
   B. Filipinos
   C. Japanese
   D. Japan

2. Which of the following are the 5Ss?
   A. Seiri, Seiton,Sweep, Seiketsu Shitzu
   B. Seiri, Seiton, Seiso, Sanitize, Shitzu
   C. Sort, Seiton, Sweep, Seiketsu, Shitzu
   D. Seiri, Systematize, Seiso, Seiketsu, Shitsu

3. It refers to the cleaning of workshop.
   A. Seiton
   B. Seiri
   C. Seiso
   D. Seiketsu

4. It is the condition to maintain high standard of good housekeeping where there is no dust and rust anywhere.
   A. Sort
   B. Systematize
   C. Sweep
   D. Sanitize

5. Which is practiced when your colleagues decide with you which things to put where taking into account the flow of your work?
   A. Sort
   B. Systematize
   C. Sweep
   D. Sanitize

6. Its advantage is to promote camaraderie among workers in the company.
   A. Shitsuke
   B. Seiton
   C. The 5Ss
   D. Systematize

7. It ensures the safety of the construction workers.
   A. Signs, Signal & Barricades
   B. Danger Signs
   C. Exit Signs
   D. Safety Instructions Signs

8. Which shall be used when an immediate hazard exists?
   A. Signs, Signal & Barricades
   B. Danger Signs
   C. Exit Signs
   D. Safety Instructions Signs

9. Which shall be used as temporary means of warning an existing hazard such as defected tools and equipment?
   A. Danger Signs
   B. Accidental Prevention Tags
   C. Traffic Signs
   D. Directional Signs

10. Which is a major factor for the prevention of shop accidents?
   A. Signs, symbols, barricades
   B. The 5Ss Principle
   C. Attitude
   D. Systematize

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 1.1**

**Directions:** Give what is being asked by the listed items below. Write your answer on the space provided.

A. Explain briefly the following 5Ss:
   1. SEIRI
   2. SEITON
   3. SEISO
   4. SEIKETSU
   5. SHITSU

B. Cite 4 advantages of the 5Ss for the people if observed strictly?

C. Enumerate 5 reasons why schools such as yours should practice the 5Ss religiously?

**Activity Sheet 1.2**

**Directions:**
1. Group yourselves into groups with five (5) members.
2. Each group shall role play for 10 to 15 minutes certain activities that are observed in the road.
3. Be sure to use safety signs and symbols as the group props.
4. Presentation shall be assessed according to the given rubrics.

**Activity Sheet 1.3**

**Directions:** This activity is a group work.

1. Perform a pantomime for 7-10 minutes.
2. Be sure that the scenario will create favorable impact on the audience zeroing in the key points on industrial hazards and accidents.
3. Performances shall be evaluated using the given rubric.

**Activity Sheet 1.4**

**Directions:**

**1.** List down all possible shop norms that you can think of based on the 5Ss which will comprise your Personal Checklist of Shop Norms.
**2.** Finalize your Personal Checklist of Shop Norms on a ¼ size illustration board which you will accomplish weekly by simply putting check marks ( / ) on shop norms that you perform consistently the whole week.
**3.** Remember*, the check marks are representative of your practices for the week*. This checklist shall be used for the whole year. So, put your extra effort to keep it clean and in perfect condition.

**Activity Sheet 1.5**

**Directions:**

1. Group yourselves according to the class grouping to perform a ***buzz session*** for 20 minutes.
2. The focus of this activity is to come up with common shop rules to prevent or minimize shop accidents due to incorrect work practices. The more rules the group can craft, the better would it be for the group.
3. Be sure that the rules determined have been written clearly on a whole sheet of butcher's paper (Manila paper).
4. Finally, let the group leader present the output to the class for discussion in order to come up with one set of rules for the entire class.

# How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

## I. ROLE PLAY (ACTIVITY SHEET 1.2)

| Scoring criteria | 5 Excellent | 4 Good | 3 Needs Some Improvement | 2 Needs Much Improvement | 1 N/A |
|---|---|---|---|---|---|
| **Relates to audience.** | | | | | |
| **Provides a fluent rendition of scenario.** | | | | | |
| **Role-plays scenario with feeling and expression.** | | | | | |
| **Varies intonation.** | | | | | |
| **Presents characters appropriately.** | | | | | |
| **Gives the scenario its full range.** | | | | | |
| **Breaches are easily identified.** | | | | | |

Scale:
30-35 A Excellent
25-29 B Good
19-24 C Needs Some Improvement
13-18 D Needs Much Improvement
7-12 F Not Appropriate

TOTAL=

Comments

## II. PANTOMIME (Activity Sheet 1.3)

| Pantomime | | | |
|---|---|---|---|
| | **Needs Improvement (N/A)** | **Developing (N/A)** | **Proficient (N/A)** |
| **Beginning** | Needs Improvement<br>Began in a wishy washy manner, did not establish the scene's beginning confidentally.<br><br>2 3 4 | Developing<br>Scene began in the middle of action, but with some sense of confidence.<br><br>5 6 7 | Proficient<br>Beginning was confident and executed well. The focus was strong and energy was present.<br><br>8 9 10 |
| **Story** | Needs Improvement<br>The pantomime had no beginning, middle, or end. It was flat and did not take the audience through a story.<br><br>2 3 4 | Developing<br>Pantomime had at least a beginning, middle, and/or end but the journey was not entirely obvious to the audience.<br><br>5 6 7 | Proficient<br>Pantomime had a full storyline: beginning, middle, and end. The performance was clear in the journey of the performer.<br><br>8 9 10 |
| **Mechanics** | Needs Improvement<br>The pantomime did not have any form to it. It was completely unclear as to what the pantomime was about and therefore unbelievable.<br><br>2 3 4 | Developing<br>The majority of the pantomime was executed well. Most of the actions were clear and the action was understood by the audience.<br><br>5 6 7 | Proficient<br>The pantomime was executed very well. All the actions were believable and therefore the overall action was clear to the audience.<br><br>8 9 10 |
| **Emotion** | Needs Improvement<br>Lack of emotional connect. Flat expressions, did not change or express feelings.<br><br>2 3 4 | Developing<br>Moderate emotions depicted, some change of feeling during the scene.<br><br>5 6 7 | Proficient<br>Excellent use of emotion and facial expression. Conveyed a sense of character and an array of feelings.<br><br>8 9 10 |
| **TOTAL** | Needs Improvement<br>_____ | Developing<br>_____ | Proficient<br>_____ |

## III. BUZZ SESSION (Assignment Sheet 1.5)

| | Beginning<br>1 point | Developing<br>2 points | Accomplished<br>3 points | Exemplary<br>4 points |
|---|---|---|---|---|
| **Contribution** | One or more members do not contribute. | All members contribute, but some contribute more than others. | All members contribute equally. | All members contribute equally, and some even contribute more than was required. |
| **Cooperation** | Teacher intervention needed often to help group cooperate. | Members work well together some of the time. Some teacher intervention needed. | Members work well together most of the time. | All members work well together all of the time; assist others when needed. |
| **On task** | Team needs frequent teacher reminders to get on task. | Team is on task some of the time. Needs teacher reminders. | Team is on task most of the time. Does not need any teacher reminders. | Team is on task all of the time. Does not need any teacher reminders. |
| **Communication** | Members need frequent teacher intervention to listen to each other and speak to each other appropriately. | Members need some teacher intervention to be able to listen to each other and speak to each other appropriately. | All members listen to each other and speak to each other in equal amounts. | Each member listens well to other members. Each member speaks in friendly and encouraging tones. |

# LEARNING OUTCOME 2

**Follow standard work processes and procedures**

## PERFORMANCE STANDARDS

- Commonly used materials are maintained in designated area according to procedure.
- Work is performed according to the standard work procedures per instructions and Occupational Health and Safety (OHS) requirements.
- Incidents are reported to immediate supervisor.

## What Do You Already Know?

**Let us determine how much you already know about following standard work processes and procedures. Take this test.**

**Pretest LO 2**

**Directions:** Choose the letter of the best answer. Write your answer on your answer sheet.

1. It is simply the application of workable principles that increases the awareness and ability of the workers to be more productive and efficient without sacrificing their safety and the product quality.
   A. Occupational Health & Safety
   B. Risk Management
   C. Work Procedure
   D. Work Simplification

2. Which primarily uses least resources in the workplace?
   A. Occupational Health & Safety
   B. Risk Management
   C. Work Procedure
   D. Work Simplification

3. What government agency is responsible primarily for setting and enforcing mandatory occupational health and safety standards through appropriate orders?
   A. Department of Public Works and Highways
   B. Civil Service Commission
   C. Department of Labor and Employment
   D. Department of Budget and Management

4. Which is **NOT** a PPE?
   A. helmets
   B. goggles
   C. clothing
   D. none of the above

5. Which is a common hazard?
   A. obstructions
   B. damaged saw blades
   C. hazardous dusts
   D. Gaseous

6. Which is a risk?
   A. Out-of-control cutting machine
   B. Vibration
   C. power cords
   D. beard, loose hair, loose clothing

7. Which is a step on risk management?
   A. Identification of Safety Procedures
   B. Hazard Identification
   C. Training the Workers
   D. Education

8. Which is a control measure on accident prevention?
   A. Workplace communication and consultation
   B. Safety and health committee meetings
   C. Regular equipment and work safety checks
   D. Education

9. Which is the emphasis of continuous training of the workers as hazard/risk management measure?
   A. Workplace safety and health.
   B. Emergency and first aid procedures
   C. Hazards and risks associated with work activities
   D. Education

10. Who are covered by the Occupational Health and Safety Regulations?
   A. Employers
   B. Workers
   C. Self-Employed
   D. All of the above

# What Do You Need To Know?

**Read Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.**

**Information Sheet 2.1**

## WORK SIMPLIFICATION

Can you imagine how an office or company would look like without any system in the workplace? How do you assess the kind of workers such an office have? What kind of products or outputs do they have? Would their effectiveness and efficiency at stake? What if you were the owner, would you be happy seeing such disorganized, unhealthy, and embarrassing workplace in your company? How would you address such behavior of the workers?

Fig. 1. Workplace without a System

What is work simplification? It is simply the application of workable principles that increases the awareness and ability of the workers to be more productive and efficient without sacrificing their safety and the product quality. Workers perform tasks expected of them in simpler ways.

Work simplification is also defined as the use of equipment, ergonomics, functional planning and behavior modification to reduce the physical and psychological stresses on the body of activities at home or at work by reducing the physical demands on the body during tasks acts to reduce the risk of injury or re-injury.

Furthermore, work simplification means the performance of steps comprising a work in a manner that is least expensive in resources such as effort, money, and time. It has to be performed in conformity with the work objective.

**Doable for Work Simplification**

Besides controlling the work environment to reduce or prevent risk of injury, the herein-listed finds very effective:

1. Establish in the workplace some simple guidelines for task set up, materials, tools, equipment storage, and work techniques and routines for reduction of physical and mental strain.

2. Modify workplace layout to enable a task to be less strenuous by:
   - storing heavier and frequently used items at waist level;
   - setting up work tasks to avoid twisting of the spine, bending forwards or reaching away from the body;
   - using tools or mechanical equipment to reduce the physical force required to complete tasks, for instance, trolleys, jacks & cranes;
   - storing infrequently used equipment below mid thigh height or above shoulder height;
   - allowing tasks be done from a sitting or standing position or rotated to allow postural change where possible;
   - using a stepladder to access higher items and reduce the need for above the shoulder reaching.

3. Modify ways of load lifting to prevent further injury by considering the following:
   - Can large loads be broken down into smaller loads to reduce the impact on the body?
   - Can the load be lifted with two hands rather than one?
   - Can handles on loads be altered to make it easier to carry the load?
   - Can loads be carried safely against the body to allow the larger muscles of the legs to support the load rather than the smaller muscles of the arms?
   - Can the load be lifted using a team lift?
   - Remember, it is more physically demanding to grip smaller items or large items with the hand at full stretch.

## OCCUPATIONAL HEALTH AND SAFETY

Philippine Occupational Health and Safety laws place responsibility for workplace safety on employers, workers, self employed people, people in control of workplaces, and the manufacturers and distributors of plant and equipment.

Employers must provide and maintain a working environment in which workers are not exposed to hazards as far as practicable. This includes providing information, instruction, training and supervision to enable workers to perform their work safely.

Workers must take reasonable care of their own safety and health and that of others, follow safety instructions and use protective clothing and equipment as instructed.

The Occupational Safety and Health laws of the Philippines require employers, main contractors, self-employed people and those in control of workplaces or access to workplaces, as far as practical, to:

- identify each hazard to which a person at the workplace is likely to be exposed;
- assess the risk of injury or harm to a person resulting from each hazard;
- take action to control or reduce the risk.

Furthermore, the Secretary of Labor is responsible for setting and enforcing mandatory occupational health and safety standards by appropriate orders, and for instituting and updating programs to ensure safe and healthy working conditions in all places of employment. To this end, a number of agencies attached to DOLE implement and issue relevant guidelines and processes.

Like in any other fields of human endeavor, masonry workers known as masons are protected by laws enabling their safety and lives secured and promoted at all times. In doing so, Personal Protective Equipment (PPE) which includes protective clothing.

- a safety helmet;
- safety footwear;
- safety goggles;
- a face shield;
- hearing protection;
- sun and weather protection;
- gloves to improve grip and reduce force and vibration; and
- where hazardous dusts or fumes cannot be eliminated, respiratory protection.

Operators should avoid wearing loose fitting clothing or jewelry. Long hair worn loose and long beards can also be hazardous.

Cutting and drilling equipment especially saw blade discs and drill bits, should be removed from machines and stored where they will not be damaged between use.

## COMMON HAZARDS

Some hazards are common to all concrete and masonry cutting and drilling operations, however there are also hazards specific to individual types of equipment, such as:

1. **Kick-back, push-back or pull-in** – these are potentially violent forces that occur suddenly and can be difficult to control. They are most likely to cause injury when hand-held or 'quick-cut' concrete or masonry saws are used, especially when chasing. They can also cause fixed concrete saws to be wrenched from their fittings, with the potential of the saw running free on the ground. It is important that training for operators includes awareness of safe work practices and the risks of kick-back. Employers and hire equipment suppliers must ensure operators have information and training on safe work practices.

2. **Obstructions or resistance in the material being cut** – these can cause sudden kick-back, push back or pull-in movements of the saw. They occur when different quadrants of the blade come into contact with obstructions or resistance within the concrete or masonry such as from reinforcing steel bars, steel mesh or brick ties.

3. **Crooked or off-line cuts** – these can cause the saw to bite or pinch resulting in kick-back, push-back or pull-in reactions. These reactions are also most likely to occur with hand-held saws.

4. **Pinched cuts** – these are caused when the object being cut moves, resulting in the cutting groove tightening on the saw blade, thus increasing the risk of kick-back etc.

5. **Blunt cutting edges** – these are caused by using a saw blade or drill bit with the wrong diamond cutting bond. If the bond or matrix holding the cutting diamonds together is too hard for the material being cut, the bonding material does not wear away quickly enough, resulting in the surface diamonds becoming blunt. This means extra force has to be applied by the operator, especially with hand-held saws, increasing the risk of kick-back, push-back or pull-in.

6. **Unsafe grip, stance or stop-start procedures for hand-held saws** – these can cause the saw to swing out of control and come into contact with the operator, or strike objects that may cause the saw to fall and run free on the ground.

7. **Worn, misshapen, cracked or damaged saw blades, or the wrong type of blade** – these can cause the blade to wobble, vibrate, shatter, or fragment and fly off. Guarding on most concrete and masonry equipment is designed to protect the operator from flying blade fragments, but not others in the workplace. Guarding should, therefore, not be regarded as a total safeguard. Blades are most likely to disintegrate when force is used, for example when the diamond cutting edge becomes dull, an obstruction is encountered, the cutting groove is not straight or the blade is pinched.

8. **Worn blade shaft** – incorrectly fitted blades or the wrong type of blade for the job can cause wear on the central shaft causing even new blades to shudder, resulting in early wearing and risk of shatter.

9. **Wrong-size blades** – these are blades either too large, too small, or the wrong type for the cutting machine or size and shape of the concrete or masonry item being cut. For example, a small diameter blade used to cut a thick slab may not penetrate sufficiently; increasing the risk of kick-back or blade-shatter should the blade strike resistance.

10. **Hazardous dusts** – these are emitted by cutting and drilling operations or equipment that does not use water for cooling cutting parts and capturing dust. Concrete dust may carry high levels of silica dust and repeated exposure can cause silicosis, which is a scarring and stiffening of the lungs. The effects are irreversible, invariably resulting in death. Coarser rock particles can cause short term throat irritation and bronchitis.

11. **Insufficient flow of coolant water** – this can cause overheating and expansion of both metal and masonry, resulting in poor performance, jamming, severe blade damage and projectile hazards.

12. **Incompatible flanges and blades** – these can cause uneven blade movement, wear and tear and the risk of blade-shatter.

13. **Incorrectly secured blades** – these are caused by nuts and flanges which are not tightened sufficiently on the saw shaft, which can cause uneven blade movement and the risk of blade-shatter.

14. **Inadequate securing of anchor points** – these can cause a fixed saw to break free from its track fittings.

15. **A beard, loose hair or loose clothing** – these can cause the operator to become entangled with moving saw blades, drill bits and other moving parts.

16. **Hand-held saw cutting above shoulder or below knee-height** – this can reduce operator control and increase the risk of kick-back, push-back or pull-in injury.

17. **Cutting concrete pipes** – this requires special safe procedures to prevent the pipe from rolling or moving during cutting, particularly when a handheld saw is used. A specific hazard during pipe cutting is pressure from the raised flange on the pipe-end

causing the cut to close and pinch the saw blade, resulting in kick-back or blade shatter injury. Other hazards include the presence of steel reinforcing mesh in concrete pipes, and a practice sometimes used for pipe-cutting involving a series of plunge cuts around a pre-drawn line on the pipe's outer surface.

18. **Toxic fumes** – without adequate ventilation, petrol motor emissions containing carbon monoxide and other toxic gases can build up to hazardous levels.

19. **Insufficient guarding** – guarding on some concrete or masonry saws is more effective than on others. When purchasing, consider the adequacy of guarding. Part of a safe work procedure should be to ensure that the manufacturer's recommended guarding is fitted to such saws. Removing guarding can greatly increase injury risk.

20. **Electric wires, gas or water pipes** – exposing services, especially in existing structures, can put the operator at risk of slipping, electrocution, exposure to toxic gases, or explosion.

21. **Power cords** – when attached to electric-powered cutting equipment and other machinery, these may be cut or damaged. Pools of water coolant and slurry could cause electrocution due to an immersed cord.

22. **Uneven or unstable surfaces** – these can increase the likelihood that the operator may trip or stumble, causing an unexpected movement of the blade resulting in kick-back.

23. **Wet, slippery floors** – coolant water and slurry on floors can cause slips and falls.

24. **Obstructions in access ways** – blocks of masonry and bricks in areas where the operator and others must stand, work or move can cause trips and falls.

25. **Vibration** – whole body or hand or arm vibration caused by prolonged use of cutting or drilling equipment can cause nerve, circulatory and joint damage.

26. **Working alone** – this can be hazardous because of the potential need for assistance in the event of an emergency situation or injury.

27. **Noise** – excessive noise from concrete cutting and drilling is a workplace hazard.

## COMMON RISKS

The most likely risks of injury or harm come from:

- flying saw fragments;
- saw kick-back, push-back or pull-in;
- out-of-control or free-running cutting machines;
- falling concrete and masonry;
- inadequate scaffolding;
- noise;
- electrocution;
- hazardous dusts from dry cutting and drilling, such as silica dust, contributing to lung disease;
- slips, trips and falls;
- manual handling or strain injuries;
- vibration damage to circulation, nerves and joints; and
- suffocation or poisoning from hazardous fumes or gases emitted by petrol motors and other equipment or damaged gas supply services.

# RISK MANAGEMENT

**How do we control risks?**

1. Hazard Identification. This includes, but not limited to, regular review of safety procedures for each type of equipment and job, regular checking of information, regular inspection of equipment before each job, and checking the possible presence and location of obstructions.

2. Risk Assessment. Assessing risks involves calculating the likelihood and severity of injury or harm resulting from identified hazards.

3. Controlling Risks. Control risks by introducing safety measures to eliminate or minimize the risk of a person being exposed to a hazard.

**Safety Procedures**

Hazard identification and risk assessment procedures should be carried out for each type of concrete or masonry cutting or drilling job, in order to develop, implement and maintain control measures for each item of equipment and each job.

1. Control measures should be regularly reviewed.

    - Workplace communication and consultation
    - Safety and health committee meetings
    - Regular equipment and work safety checks
    - Incident, accident and near-miss records
    - Injury and lost time records
    - Repair and maintenance reports

2. Workers should be continuously trained specifically on information and instruction on

    - Workplace safety and health
    - hazards and risks associated with work activities
    - Safe work practices and procedures, safe handling (including lifting and moving), safe operation of equipment and the control measures in place
    - Safe use of plant and associated equipment, electrical safety, safety in confined spaces and other training required under hazard-specific regulations
    - Hazardous substances relevant to the work to be performed
    - Correct use, fit and care of PPE , tools and equipment and why the equipment is needed
    - Emergency and first aid procedures
    - Sun protection to prevent skin cancer
    - Fire protection
    - Information on dust, fumes and air quality
    - Recognition of poorly ventilated areas and confined spaces

# How Much Have You Learned?

**Self-Check 2.1**

**Directions:** Choose the letter of the best answer. Write your answer on your answer sheet.

1. It is simply the application of workable principles that increases the awareness and ability of the workers to be more productive and efficient without sacrificing their safety and the product quality.
   A. Occupational Health & Safety
   B. Risk Management
   C. Work Procedure
   D. Work Simplification

2. Which primarily uses least resources in the workplace?
   A. Occupational Health & Safety
   B. Risk Management
   C. Work Procedure
   D. Work Simplification

3. What government agency is responsible primarily for setting and enforcing mandatory occupational health and safety standards through appropriate orders?
   A. Department of Public Works and Highways
   B. Civil Service Commission
   C. Department of Labor and Employment
   D. Department of Budget and Management

4. Which is NOT a PPE?
   A. helmets
   B. goggles
   C. clothing
   D. none of the above

5. Which is a common hazard?
   A. obstructions
   B. damaged saw blades
   C. hazardous dusts
   D. all of the above

6. Which is a risk?
   A. Out-of-control cutting machine
   B. Vibration
   C. power cords
   D. beard, loose hair, loose clothing

7. Which is a step on risk management?
   A. Identification of Safety Procedures
   B. Hazard Identification
   C. Training the Workers
   D. Education

8. Which is a control measure on accident prevention?
   A. Workplace communication and consultation
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9. Which is the emphasis of continuous training of the workers as hazard/risk management measure?
   A. Workplace safety and health
   B. Emergency and first aid procedures
   C. Hazards and risks associated with work activities
   D. All of the above

10. Who are covered by the Occupational Health and Safety Regulations?
   A. Employers
   B. Workers
   C. Self-Employed
   D. All of the above

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Activity Sheet 2.1**

**I. For the created teams.** A team will be selected to perform the main activity.

1. The selected team shall re-arrange the shop layout according to the pointers on work simplification designed to minimize occupational hazards, thus promotes workers health and safety.
2. The team shall be given 15 minutes to prepare a plan which shall be executed for a maximum of ten minutes.
3. The team performance shall be evaluated by the audience using deliberative judging.

**II. For the audience-judges.** Those who were not selected as team members shall play the role of audience-judges. While the team deliberates on the shop layout to be executed, the audience-judges:

1. conduct a buzz session headed by a leader who shall act as the supreme judge in order to craft a rubric for the team performance;
2. shall present individually their comments/remarks backed up with appropriate justifications after the team has performed their task. The team members shall not make any comment or remark; instead, they shall listen or give an answer whenever asked.
3. The final rating of the team shall be announced by the supreme judge who shall act as mediator or set a ruling, whenever possible.

**Activity Sheet 2.2**

Each group shall initiate a 10 minute-panel discussion on Occupational Health and Safety. The following are the general guidelines for the groups in holding the panel discussion:

- The group may invite experienced persons who shall sit as panel guests. The group members shall serve as panelists, therefore, they are responsible for shooting particular questions or topics for discussion.
- Identified group members may play the role of experienced guests who are responsible for shading lights on the issues or concerns on hand; Others shall play as panelists and responsible for running a quality show.

## How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

### Panel Discussion Rubric

**Symbols and Meaning:**

**___√+ Consistently ___√ Usually ___√- Seldom**

**Knowledge:**

____ The student (group) used research to advance arguments and defend positions.

____ Research was effectively applied to arguments.

**Understanding:**

____ The student (group) demonstrates understanding of the issue.

____ The student (group) presented key points.

____ The student (group) presented original ideas.

____ The student (group) was able to use examples or analogies to defend an argument.

____ The student (group) demonstrated empathy for the cause he or she represented.

____ The student (group) showed respect for others' opinions.

**Communication:**

____ The student (group) was logical in presenting arguments.

____ The student (group) was able to communicate effectively and clearly.

____ The student (group) incorporated key terminology/vocabulary.

**Participation:**

____ The student contributed to the discussion.

____ The student tended to dominate a discussion, thereby hindering others' participation.

**For group evaluation:**

____ All students participated in the discussion.

____ Students within the group tended to dominate discussion within the group, hindering other group members' participation?

# How Do You Extend Your Learning?

**Assignment Sheet 2.1**

**Directions:** On pieces of short size bond paper, prepare Pre-site Safety Checklist and Materials, Tools & Equipment Checklist. Be sure that important elements of a checklist are covered or included.

**Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!**

## REFERENCES


**LO 1**

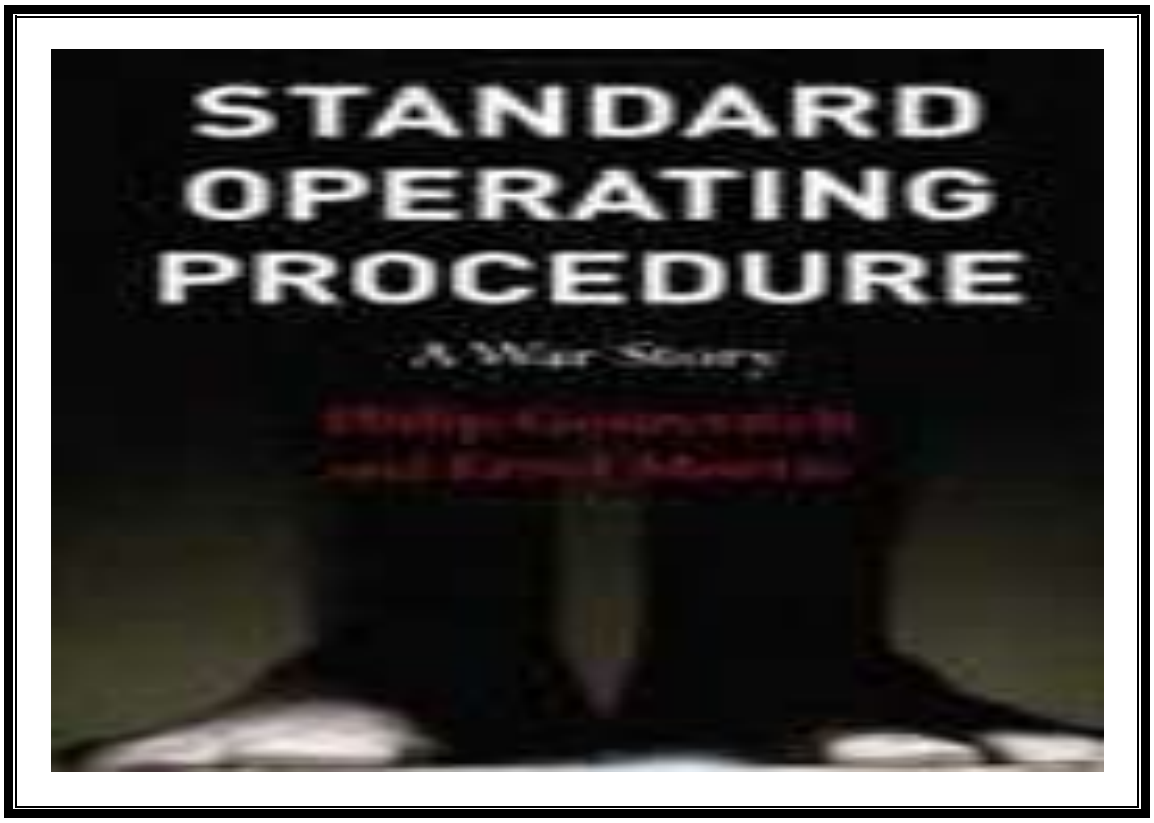
- www.co.kern.ca.us/cao/policy/12.pdf (Accidents)
- http://images.search.yahoo.com/search/images;_ylt=A0PDoS.Q40VP2hoAbxyJzbkF?p=cooperation&fr=yfp-t-701&ei=utf-8&n=30&x=wrt&y=Search
- TESDA Handouts
- Pardinas, J. (2012). *Handout on Signs and Symbols*.
- http://museumca.org/goldrush/curriculum/we_accuse/tgrouprubric.html

**LO 2**

- http://www.answers.com/topic/work-simplification
- http://wiki.answers.com/Q/Why_is_work_simplification_important&src=ansTT
- http://jobaccess.gov.au/Advice/JobRequirement/Pages/Work_simplification.aspx
- http://www.productivity.in/knowledgebase/Industrial%20Engineering%20Docs/b.%20Methods%20Engineering/2.5%20Work%20Simplification.pdf
- http://medical-dictionary.thefreedictionary.com/work+simplification
- http://www.sarihands.com/page22/page6/page6.html
- http://www.ehow.com/list_6545478_safety-procedures-workplace.html
- http://ezinearticles.com/?Workplace-Safety-Tips---My-Top-Ten-List&id=285032
- http://www.hg.org/workplace-safety-law.html
- http://www.ehow.com/how_5130592_report-workplace-accidents.html
- http://images.search.yahoo.com/search/images;_ylt=A0oGdbicXUdPzzcAip1XNyoA?p=disorganized%20workplace&fr=yfp-t-701-s&fr2=piv-web
- http://www.hrmasia.com/employment-law-asia/philippines/49406/#4
- http://www-tc.pbs.org/pov/pov2001/promises/lessonplan.pdf

LESSON 3

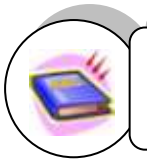
# Observe procedures, specifications, and manuals of instructions




## LEARNING OUTCOMES:

**At the end of this Lesson, you are expected to do the following:**

**LO 1. identify access, and interpret materials specification;**
**LO 2. apply information from the manual; and**
**LO 3. store the manuals.**



# Definition of Terms

**Accessing** – the process of entering information or data

**Application -** the observance of or putting into the work or job specifications provided for in the manual of instruction

**Catalogues** - the book containing list of items, object or materials /parts

**Construction sector** - the group or field of specialization

**Data** - the factual information or applied to any given task

**Instructional materials** - reading materials, such as books, manuals, video tapes, cd's and other related items

**Manual** - book catalogue that explains how to use certain materials, tool or equipment

**Specification** - the descriptive characteristics of a certain manual, job or type of work

**Store** - the process of keeping the manuals or any documents to prevent them from being damaged

**Storing cabinet** - a wooden or steel enclosure where manuals and catalogues are stored

**Version** - the style or way on how certain data are encoded

**TABS** - labels or tags attached at the edge of certain pages of a book or compilation

**Warranty period** - the number of days, months or years that a certain item purchased or delivered is guaranteed by the supplier or the source for repair or replacement if found damaged or destroyed under normal conditions

# LEARNING OUTCOME 1

**Identify access and interpret specification materials**

## PERFORMANCE STANDARDS

- Manuals are identified and accessed per job requirements.
- Version and date of manual are checked to ensure that correct specifications and procedures are identified.
- Relevant sections, chapters, and specifications in the manuals are located in relation to the work to be conducted.
- Information and procedure in the manual are interpreted in accordance with industry practices.

## What Do You Already Know?

**Let us determine how much you already know about identifying access and interpreting specification materials. Take this test.**

**Pretest LO 1**

**Directions:** Choose the letter of the best answer. Write your answer on your answer sheet.

1. It is also called owner's manual.
   A. parts manual
   B. service manual
   C. operator's manual
   D. diagnostic manual

2. Which is **NOT** included in an operator's manual?
   A. basic maintenance
   B. safety information
   C. specification
   D. parts number

3. It is a type of manual where the part number and brief description are indicated.
   A. operator
   B. part
   C. service
   D. repair

4. It is also called the shop/repair manual
   A. service
   B. repair
   C. part
   D. operator

5. Which is **NOT** included in the service manual?
   A. shop
   B. repair
   C. technical
   D. none of them

6. This refers to the steps performing certain task.
   A. procedure C. specification
   B. instruction D. manual

7. It is a type of manual where entries are very detailed.
   A. parts C. operator
   B. service D. shop
8. It is also called book manual or catalog manual.
   A. repair C. parts
   B. service D. shop

9. This refers to the descriptive characteristics or materials/tools.
   A. specification C. data
   B. version D. manual

10. It is a type of manual where basic maintenance and safety information are specified.
   A. service C. repair
   B. shop D. open book

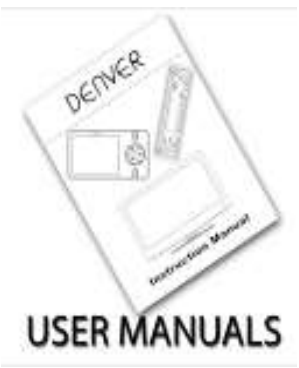
# What Do You Need To Know?

**Read Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.**

**Information Sheet 1.1**

## MANUAL

A manual contains a systematic process that which describes in a very clear and step-by-step procedure. Otherwise, it will be a confusing manual which leaves the reader no better able to complete the process after reading it than he or she was before. Normally, it uses diagrams to clarify information that would be difficult to convey accurately in words. Also, use them for information that is so complex as to be confusing to the reader without a visual representation of the item, part or process to which he can refer as he carries out the manual's instructions.



Manuals /catalogues should be identified per job description. They must be updated and checked to ensure their content is updated. Manuals /catalogues should be stored properly to avoid damage.

## TYPES OF MANUAL

1. **Operator's Manual** is called owner's manual, instructional book, and handbook. It shows how to safely operate and use a machine. Usually it includes basic maintenance, safety information and specifications.

   The biggest and most important sections of an operator's manual should include: company policies, topics off limits for representatives and detailed answers to the most common questions

2. **Parts Manual** is also called parts book, parts catalog, or spare parts list used by representatives or dealer. It contains exploded parts, their relationship and location. Usually, it includes the part number and their brief description.

3. **Service Manual** is also called shop, repair, workshop and technical manual. Some of the types are very detailed, while some are shortened versions or specific areas of repair –ex. Hydraulic system only.

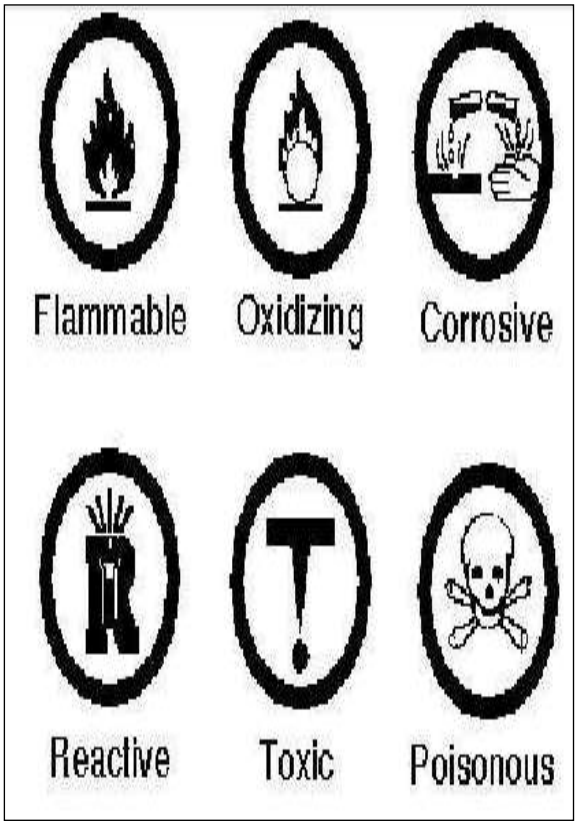
   A repair manual which is a service manual has the following sections: parts guide, symptom/solution troubleshooting matrix, contact information, routine maintenance, document conventions section, glossary, table of contents.

### Signs and Symbols

Most manuals of any type contain instructions, specifications, or certain information accompanied by different signs and symbols for clarity and emphasis. Some are used to caution or alarm the reader. Signs and symbols used are dependent upon the type of

manual. However, there are similar symbols and signs which are found in almost all manuals of different types.

Below are some signs and symbols that are found in various manuals:



## How Much Have You Learned?

**Self-Check 1.1**

**Directions:** Choose the letter of the best answer. Write your answer on your answer sheet.

1. It is also called owner's manual.
   A. parts manual
   B. service manual
   C. operator's manual
   D. diagnostic manual

2. Which is **NOT** included in an operator's manual?
   A. basic maintenance
   B. safety information
   C. specification
   D. parts number

3. It is a type of manual where the part number and brief description are indicated.
   A. operator
   B. part
   C. service
   D. repair

4. It is also called the shop/repair manual
   A. service
   B. repair
   C. part
   D. operator

5. Which is **NOT** included in the service manual?
   A. shop
   B. repair
   C. technical
   D. none of them

6. This refers to the steps performing certain task.
   A. procedure
   B. instruction
   C. specification
   D. manual

7. It is a type of manual where entries are very detailed.
   A. parts
   B. service
   C. operator
   D. shop

8. It is also called book manual or catalog manual.
   A. repair
   B. service
   C. parts
   D. shop

9. This refers to the descriptive characteristics or materials/tools.
   A. specification
   B. version
   C. data
   D. manual

10. It is a type of manual where basic maintenance and safety information are specified.
   A. service
   B. shop
   C. repair
   D. open book

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 1.1**

**Directions:** Answer the following questions by writing the correct answer on the blank provided.

**1.** What are the different types of manuals?

**a.** _____
**b.** _____
**c.** _____

**2.** How many versions does each manual have?

_____
_____
_____
_____
_____

# How Do You Extend Your Learning?

**Assignment Sheet 1.1**

**Directions:** This is a group work.

1. Gather different manuals (photocopies) and classify them according to types.

2. Find out the commonalities of manuals in each type in terms of major parts/sections, signs and symbols used, and healthy tips or precautionary measures.

3. Also, find out the latest updates in each of the manuals by taking into account the publication date and version.

   Be ready to report your output to the class for discussion.

# LEARNING OUTCOME 2

**Apply information from the manuals**

## PERFORMANCE STANDARDS

- Work steps are correctly identified in accordance with the manufacturer's specifications.
- Manual data are applied according to the given task.
- Manual or specification is stored appropriately to prevent damage, ready access and updating of information when required in accordance with

## What Do You Already Know?

**Let us determine how much you already know about applying information in the manuals. Take this test.**

### Pretest LO 2

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which is supplied with TABS printed on the edges of each page for each section**?**
   A. owner's manual
   B. parts manual
   C. service manual
   D. warranty manual

2. Why sections of this manual should be well-arranged?
   A. To facilitate reference especially of the first-time owner.
   B. Because the pertinent laws so require.
   C. To encourage more customers.
   D. To show the importance of the manual.

3. Which is section of the manual?
   A. What's in the Box
   B. Basic Use
   C. Special Features
   D. All of the above

4. It is a large table that lists common problems user might encounter with a known cause and solution.
   A. Setup
   B. Troubleshooting
   C. Connections
   D. Specifications

5. This is sometimes provided as a separate sheet.
   A. Getting Started
   B. Advanced Use
   C. Warranty Information
   D. Specifications

6. It explains to the readers what needs to be done first before they continue with the manual.
   A. Getting Started
   B. Advanced Use
   C. Warranty Information
   D. Specifications

7. Which describes the step-by-step procedure?
   A. Setup
   B. Troubleshooting
   C. Connections
   D. Specifications

8. Which contains all basic operations?
   A. What's in the Box
   B. Basic Use
   C. Special Features
   D. Getting Started

9. When is the detailed repair information added to the manual?
   A. 18th Century
   B. 19th Century
   C. 20th Century
   D. 21st Century

10. Why is it that this manual should be multilingual?
   A. To encourage more customers.
   B. To ensure that this is understood.
   C. So that the same box product can be sold in many different markets.
   D. To showcase the best of the products.

11. It is an indispensible document in a shop.
   A. owner's manual
   B. service manual
   C. parts manual
   D. All of the above

12. Which is needed when accomplishing a project or job?
   A. owner's manual
   B. service manual
   C. parts manual
   D. All of the above

13. It is kept for future reference.
   A. equipment
   B. manuals
   C. materials
   D. manuals

14. Which is the most appropriate storage place for these manuals?
   A. Box
   B. Cabinet
   C. on top of the table
   D. anywhere

15. Why should manuals be kept properly?
   A. They are expensive.
   B. They are not easy to find.
   C. They can be used for future references.
   D. All of the above.

# What Do You Need To Know?

**Read Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.**

**Information Sheet 2.1**

## APPLICATION OF SPECIFICATION FROM THE MANUALS

An owner's manual (also called as instructional manual) is an instructional book or booklet that is supplied with almost all technologically advanced consumer product such as vehicles, appliances and computer peripherals. It is a reference tool which means it is supplied with TABS printed on the edges of each page for each section. These sections are well-arranged for easy reference especially of the first-time owner.

Generally, these sections include the following:

- **What's in the Box**. It is what the customers need to know when they open the box in case something is missing. Parts are in full basic form. Example: Player, remote, cable, manual, and batteries. There are pictures of these parts for facility purposes as some users may be inexperienced and need assistance in identifying parts.
- **Getting Started**. It explains to the readers what needs to be done first before they continue with the manual. This includes removing hidden packing material inside the device, removing a transit screw or installing a part that must be installed before starting such as an ink cartridge, or removing clear protective plastic film over displays or other parts.
- **Connections (or Installing**). It includes the step-by-step directions. In case of connecting or installing a device, it shows action photos of the product being installed. Photos are very important. The manual is of great help due to its photos.
- **Setup (or Configuration**). In this section, the step-by-step directions with images on how to configure or setup your product are included. Detailed steps are enumerated with clear photos or screen shots.
- **Basic Use (or Operation).** ). In this section, all basic operations are listed. These basic operations are to be used daily.
- **Advanced Use (or Operation).** In this section, all advanced operations are listed which will be performed mainly by advanced users.
- **Special Features.** These are those that set the product apart from others.
- **Troubleshooting.** This section is a large table that lists common problems user might encounter with a known cause and solution. It includes general issues like "Sound but no video", "Video but no sound", "Starts up but shuts itself off again".

- **Specifications.** In this area, list of electrical specifications, physical dimensions, weight, fidelity specs is found. Also, list of limitations such as a sound meter's range, the maximum power output of an amplifier or maximum speed of a drill or saw is specified.

- **Parts List**. This area provides an exploded view of the device. The parts listed cover all detailed parts with part numbers and names. This page also includes a phone number, website, and email address to obtain replacement parts as appropriate for the product.

- **Warranty information**. This is sometimes provided as a separate sheet.

Until the last decade or two of the twentieth century, it was common for an owner's manual to include detailed repair information such as a circuit diagram. However, as products became more complex, this information was gradually relegated to specialized service manual, or dispensed with entirely , as devices became too inexpensive to be economically repaired.

Owner manuals for simpler devices are often multilingual so that the same boxed product can be sold in many different markets. Sometimes, the same manual is shipped with a range of related products such that the manual contains a number of sections that apply only to some particular models in the product range.

## STORING THE MANUALS

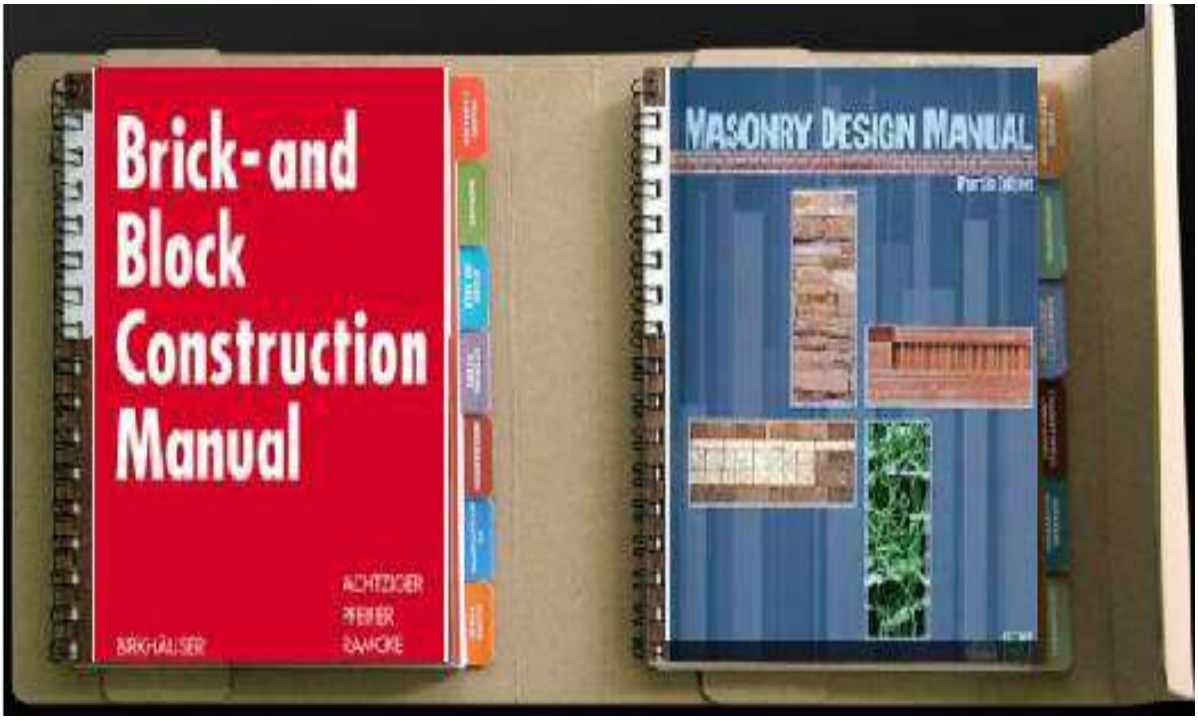


Fig.1. Keeping the Manuals

Manuals, as discussed previously in this module, are indispensable documents as with tools and equipment needed in fixing the masonry materials. Any project or job needs some bases such as these manuals to bring them to completion. Considering the importance role they play, these manuals should be kept properly for future job or service reference. If possible, they have to be covered with plastic cover to preserve their life. Proper labeling should be done by type for facility. Thus, storing should be by type.

These manuals should be stored in cabinets or shelves away from sunlight or harm brought about by insects or house pest such as rats. Extra care should be exercised for finding replacements is not that easy and burden-free when they are needed the most. They should also be kept in a strategic location for easy access. Moreover, they should be returned to their respective places after use. Otherwise, you will find them messy or not anymore readable due to some contracted elements.

## How Much Have You Learned?

**Self-Check 2.1**

**Directions:** Identify which manual to be accessed given the following situations. Write your answer on the space provided.

1. A product needs to be installed at home _____
2. Something went wrong with the device you are using. You want to know how to fix it _____
3. The device you need to use arrived in pieces, you must assemble it properly _____
4. You need to know the power rating and the power consumption of the device you are using _____
5. An accident should be avoided while using a device _____

**Direction:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. It is an indispensible document in a shop.
   A. owner's manual
   B. service manual
   C. parts manual
   D. All of the above
2. Which is needed when accomplishing a project or job?
   A. owner's manual
   B. service manual
   C. parts manual
   D. All of the above
3. It is kept for future reference.
   A. equipment
   B. manuals
   C. materials
   D. tools
4. Which is the most appropriate storage place for these manuals?
   A. Box
   B. Cabinet
   C. on top of the table
   D. anywhere
5. Why should manuals be kept properly?
   A. They are expensive in terms of cost.
   B. They are not easy to find.
   C. They can be used for future reference.
   D. All of the above.

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 2.1**

**I.** Answer the following questions by writing your answer on the blank provided.

**A.** What are the different work steps in manufacturer's specification?

**1.** _____
**2.** _____
**3.** _____
**4.** _____
**5.** _____

**B.** Generally, what are the major sections of a manual?

**1.**_____
**2.**_____
**3.**_____
**4.**_____
**5.**_____
**6.**_____
**7.**_____
**8.**_____
**9.**_____
**10.**_____
**11.**_____

**C.** How can you apply the manual data?

_____
_____
_____
_____

**II.** If you were a shop owner, what rules would you implement as far as handling of manuals is concerned? Formulate your own rules to be observed by your workers.

# How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

Shop Name: _____ Date:_____

Person Interviewed:_____

| ASSESSMENT CRITERIA | Evident | Not So Evident | Not at All |
|---|---|---|---|
| 1. Pages of the manuals are checked for sequencing from front to back cover | _____ | _____ | _____ |
| 2. Manuals are stacked according to sizes and type | _____ | _____ | _____ |
| 3. The manual in storage box or cabinets are labeled and alphabetically arranged according to titles | _____ | _____ | _____ |
| 4. Manuals are stored in a clean, cool, chemical-free, heat-free and extreme sunlight area. | _____ | _____ | _____ |
| 5. Stored manuals are accessible anytime when needed. | _____ | _____ | _____ |

# How Do You Extend Your Learning?

**Assignment Sheet 2.1**

**I.** How can you perform some specifications in the manual? Interview other shop teacher or a shop worker.

**II.** Visit some shops and observe how the manuals are handled and stored. You may also ask some tips from the shop workers or owner as to handling of these manuals. Then, accomplish this activity when you get back home by putting a tick mark on the appropriate space of the assessment criteria provided based on the shop visit that you conducted.

**Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!**

## REFERENCES

**LO 1**

- http://images.search.yahoo.com/search/images;_ylt=A2KJkIazlktPMnwAkieJzbkF?p=signs+and+symbols+in+the+product+manuals&fr=yfp-t-701&ei=utf-8&n=30&x=wrt&y=Search
- http://en.wikipedia.org/wiki/Owner%27s_manual
- http://www.ehow.com/how_2103182_write-customer-service-manual.html
- http://www.ehow.com/how_5730128_write-repair-manual.html
- http://www.ehow.com/how_2273446_write-manual
- http://en.wikipedia.org/wiki/Instruction_manual

**LO 2**

- http://www.ehow.com/how_5140680_write-user-manual.html
- http://www.ehow.com/how_4827020_write-user-manual-software.html

**LO 3**

- http://images.search.yahoo.com/search/images;_ylt=A2KJkIazlktPMnwAkieJzbkF?p=signs+and+symbols+in+the+product+manuals&fr=yfp-t-701&ei=utf-8&n=30&x=wrt&y=Search
- http://en.wikipedia.org/wiki/Owner%27s_manual
- http://www.ehow.com/how_2103182_write-customer-service-manual.html

LESSON 4

# Perform mensurations and calculations

## LEARNING OUTCOMES:

**At the end of this Lesson, you are expected to do the following:**

**LO 1. carry out measurement and calculations; and**
**LO 2. select measuring instruments.**

# Definition of Terms

**3-Dimensional figures** – solid objects that have length, width and height

**Convert** – change something into another form, substance, state, or product; transform

**Dimension** – measure of spatial extent, especially width, height, or length

**Displacement** – vector or the magnitude of a vector from the initial position to a subsequent position assumed by a body

**Face** – flat surface of an object

**Magnitude** – number assigned to a quantity, such as weight, and used as a basis of comparison for the measurement of similar quantities

**Polygon** – plane figure made up of three or more closed line segments

**Scaffold** – temporary platform, either supported from below or suspended from above, on which workers sit or stand when performing tasks at heights above the ground

**Shapes** – objects, outlines or figures as visualized by the observer/s

**Side** – line segment of a polygon

**Structure** – something made up of a number of parts that are held or put together in a particular way

# LEARNING OUTCOME 1

**Carry out measurement and calculations**

## PERFORMANCE STANDARDS

- Calculation needed to complete work tasks done.
- Accurate measurements are obtained according to job requirements.
- Systems of measurement are identified and converted according to job requirements.
- Measure work pieces according to job requirements.

## What Do You Already Know?

**Let us determine how much you already know about carrying out measurement and calculations. Take this test.**

### Pretest LO 1

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Why is there a need for considering the dimensions of the given work before its accomplishment?
   A. To determine the materials needed.
   B. To avoid or minimize waste of resources.
   C. To be able to know the total expenses.
   D. All of the above.

2. If the distance of 2 posts is 5 meters, how many pieces of concrete hollow block are needed for two layers where each CHB is 0.40 m?
   A. 10 pcs.
   B. 12.5 pcs.
   C. 25 pcs.
   D. 25.5 pcs.

3. Which tells us not only the magnitude but also the direction?
   A. Mensuration
   B. Conversion
   C. Scalar quantity
   D. Vector quantity

4. Which is used to measure length or distance, width, and height?
   A. Pull-push-rule
   B. Tape measure
   C. Spirit level
   D. Ruler

5. Which is the length of a CHB?
   A. 16 ft
   B. 16 in
   C. 16 m
   D. 16 cm

# What Do You Need To Know?

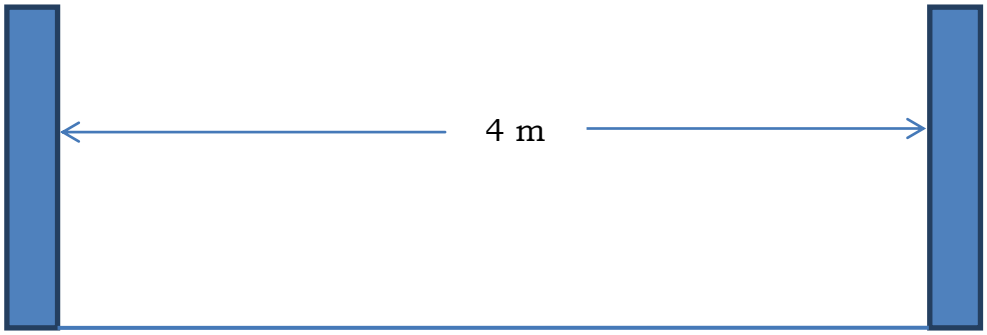
**Read Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.**

**Information Sheet 1.1**

## MENSURATION

One of the reasons why we need to measure is to help us determine how much material is needed for a certain piece of work.

Example: We need to measure the distance between two posts to determine how many concrete Hollow Blocks would fit in for one layer. If the clear distance between 2 posts is 4 meters, how many CHB will be used for the first layer? (The length of a CHB is 0.40 m)




Divide 4 m by 0.4 m — 4 ÷ 0.4
The quotient is 10 — 4 ÷ 0.4 = 10
Therefore, there are 10 pcs of CHB that will be used for one layer

### Kinds of Measurement

Generally there are 2 kinds of measurement

1. ***Scalar quantity*** – this tells us only the magnitude or amount of quantity
   Example 1. Length – 2 m
   Example 2. Area = 4.5 sq. m or 4.5 $m^2$

2. ***Vector quantity*** – this tells us not only the magnitude but also the direction.
   Example 1. Force = 20 Newtons to the right (without the direction the 20 Newtons is senseless)
   Example 2. Displacement = S20 m, N $35^0$ E

### Measuring Instruments/Measuring Tools

The measuring tape or the so-called push-pull rule is usually used to measure length, distance, and width.

There are times that standard measuring tools are not on hand when we are in the working site. With these unlikely situations, the resourcefulness of the worker is needed. The following materials can be used.

1. ***Plywood*** - The longer side is measuring 8 feet.
   - The shorter side is measuring 4 feet.
   - Each of the 4 corners is $90^0$

2. **CHB** - (regardless of its thickness) the length is 16 inches
   - The width is 8 inches. Refer to Figure 1 below:

3. ***Reinforcing Steel Bars*** (Kabilya) the length is 6 m although there are other commercial lengths, that is 7.5 m, 9 m, 12 m, etc. but usually it measures 6 m.

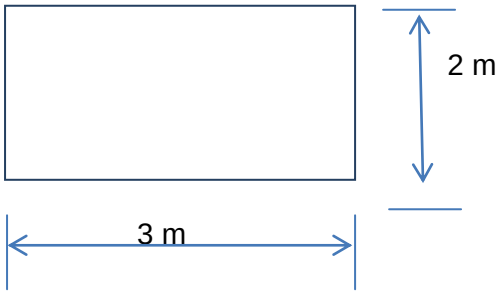
4. ***Cigarettes*** (100's) menthol 100's measures 100 mm or 10 cm roughly equal to 4 inches. (Smoking is prohibited in the working site.)

Here, we will deal only with scalar quantity. As far as measuring work is concerned, we will be dealing only with measurement of length, area and volume.

Length, distance, height and depth – these are examples of one-dimensional quantity that could be measured in terms of meter, feet, inches, cm, mm, and others . Since, these tell us how far apart points are, simply place the zero (0) mark of the measuring tape coinciding the first point of the object to be measured. Whatever the value on the measuring tape that will coincide the second point is the measurement of the object. Refer to Figure 2 below:

1. ***Area*** – quantity that expresses the extent of two-dimensional surface or shape. In most cases, only the dimension is being measured and the area itself is computed.

   Example: What is the area of this rectangle?

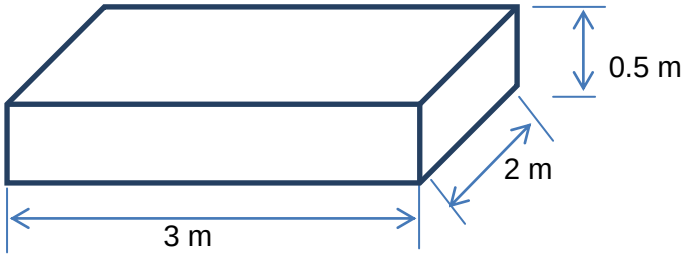



   The area of the rectangle can be computed by multiplying the length by its width

   A = L x W
   = 3m x 2m
   A = 6 $m^2$

2. ***Volume*** – three-dimensional space enclosed by some boundaries like area, volume also can be computed after measuring the necessary dimension.

Example: What is the area of this rectangular prism?




The area of the rectangular prism can be computed by multiplying the length, width and the thickness

V = L x w x h
= 3m x 2m x 0.5m
= 3 $m^3$

**Conversion**

Why is there a need for converting units? We need to convert a quantity from one unit to another in order to:

***1. Compare the given quantities***

Example: 1 m + 2 ft = ___ (Definitely, the total is neither 2 meters nor 2 feet)

***2. Use a particular formula***

Example: Number of CHB = A x 12.5 pcs/$m^2$

Where A = area in $m^2$
12.5 is constant to find the number of pieces of CHB.

If area is in square feet, the given formula cannot be used.

**Convert 10 ft. into meter (from English to metric system).** Solutions are shown below **:**

1. ***English System to Metric System*** (fraction method)

10 ft = ___?___m

- conversion factor: 3.28 ft = 1 m
- make two ratios : $\frac{3.28\ ft}{1\ m}$ **OR** $\frac{1\ m}{3.28\ ft}$
- choose the ratio that will cancel the given unit : $\frac{1\ m}{3.28\ ft}$

- multiply the given quantity to the chosen ration and cancel the given unit:

$$10\ \text{ft} \left[\frac{1\ \text{m}}{3.28\ \text{ft}}\right] = \frac{10\ \text{m}}{3.28}$$

Therefore; **10 ft = 3.048 m**

**OR**

2. ***English System to Metric System*** (SI method)

- **Formula: feet X 0.305 = meter** **where:** 0.305 is constant

10 ft X 0.305 = **3.05 m**

## How Much Have You Learned?

**Self-Check 1.1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Why is there a need for considering the dimensions of the given work before its accomplishment?
   A. To determine the materials needed.
   B. To avoid or minimize waste of resources.
   C. To be able to know the total expenses.
   D. All of the above.

2. If the distance of 2 posts is 5 meters, how many pieces of CHB are needed for two layers where each CHB is 0.40 m?
   A. 10 pcs. C. 25 pcs.
   B. 12.5 pcs. D. 25.5 pcs.

3. Which tells us not only the magnitude but also the direction?
   A. Mensuration C. Scalar quantity
   B. Conversion D. Vector quantity

4. Which is usually used to measure length or distance, width, height, etc.?
   A. Pull-push-rule C. Spirit level
   B. Tape measure D. Ruler

5. Which is the length of a CHB?
   A. 16 ft C. 16 m
   B. 16 in D. 16 cm

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

Activity Sheet 1.1

**Directions:** Answer the following item. Show your solution.

1. What is the total area of a rectangle if the length is 8.5 m and the width is 4.5 m?
2. Find out the total area of a rectangular prism if the length is 8 inches, width is 4 inches, and height is 5 inches?
3. If an inch is 2.54 centimeters, how many centimeters are there in 8 inches?
4. What is the equivalent of 13 feet in meter?
5. Find out the total volume of a cube if the thickness is 4 in, width is 6 in, and length is 6 in?

# How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

If you got:

- 5 correct answers, Congratulations! You are competent in calculations;
- 4 correct answers, your knowledge and skills in calculations is just average;
- 0 to 3 correct answers, you need to review your notes on calculations or you may ask your teacher for further explanation and exercises.

# How Do You Extend Your Learning?

Assignment Sheet 1.1

**Directions:** Take the measurement of your main door at home. The unit to be used is feet. Convert measurements in meter showing your computation. Then, lay down the converted measurements beside the illustration of your main door to be drawn below:

- Our main door at home:

# LEARNING OUTCOME 2

**Select measuring instrument**

## PERFORMANCE STANDARDS

- Measuring tools are selected /identified per object to be measured.
- Correct specifications are obtained from relevant sources.
- Measuring instruments are selected according to job requirements.
- Alternative measuring tools are used without sacrificing cost and quality work.

## What Do You Already Know?

**Let us determine how much you already know about selecting measuring instrument. Take this test.**

**Pretest LO 2**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

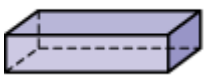
1. Which provides variation and charm in buildings?
   A. Polygons
   B. Sold Figures
   C. Plane Figures
   D. Shapes

2. Which is a plane figure?
   A. Triangle
   B. Pentagon
   C. Octagon
   D. All of the above

3. It has so many angles?
   A. Polygon
   B. Solid Figure
   C. Plane Figure
   D. Cone

4. It has a solid figure that has curved surfaces and can roll.
   A. Plane Figure
   B. Solid Figure
   C. Sphere
   D. Cone

5. Which has faces?

A  B C. D. All of the above

# What Do You Need To Know?

**Read Information Sheet 2.1 very well then find out how much you can remember and how much you learned by doing Self-check 2.1.**

**Information Sheet 2.1**

## VISUALIZING OBJECTS AND SHAPES SPECIFICALLY GEOMETRIC SHAPES

Geometric shapes are all around us – in the buildings where we live in, the cars we ride in, even the food we eat.

Shapes are evident in all architecture. They provide variation and charm in buildings. When applied to manufactured articles such as printed fabrics, wallpapers, and tile flooring, shapes enhance the beauty of the structure itself.

We should realize we are surrounded by many different kinds of shapes every day.

**Polygons and Solid Figures**

Many of these shapes are two-dimensional **plane figures.** Plane figures made up of three or more closed line segments are **polygons.** Each line segment of a polygon is a **side.** Polygons are classified by the number of sides.

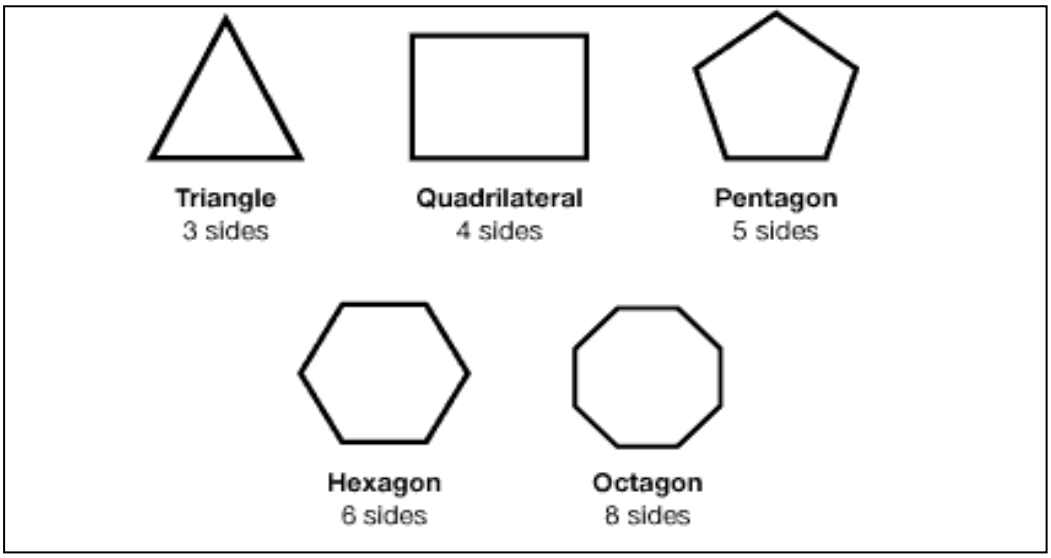



**Figure 1. Plane Figures**

The word polygon is derived from the Greek words meaning many angles. A *polygon* is a closed plane figure formed by three or more line segments which intersect only at their endpoints. Each endpoint is common to exactly two segments.

Unlike plane figures, solid figures are not flat; they have three dimensions.

Some solid figures have curved surfaces; they can roll.

Solid figures are 3-dimensional figures that have length, width, and height.

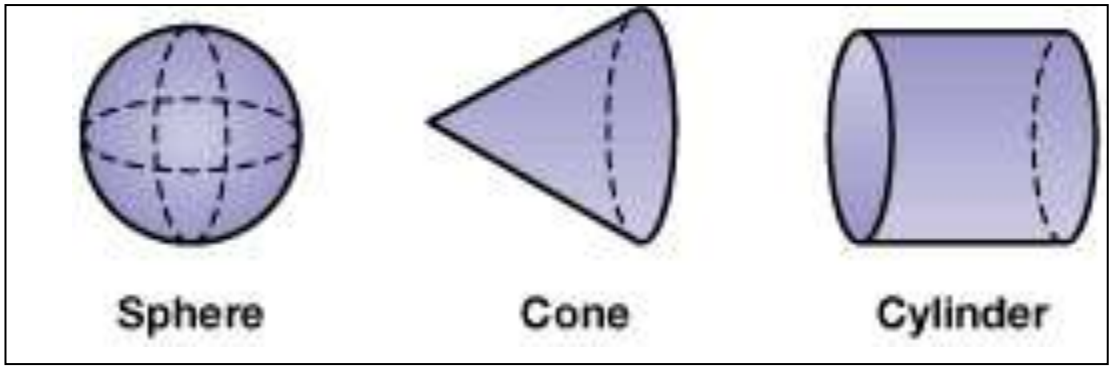
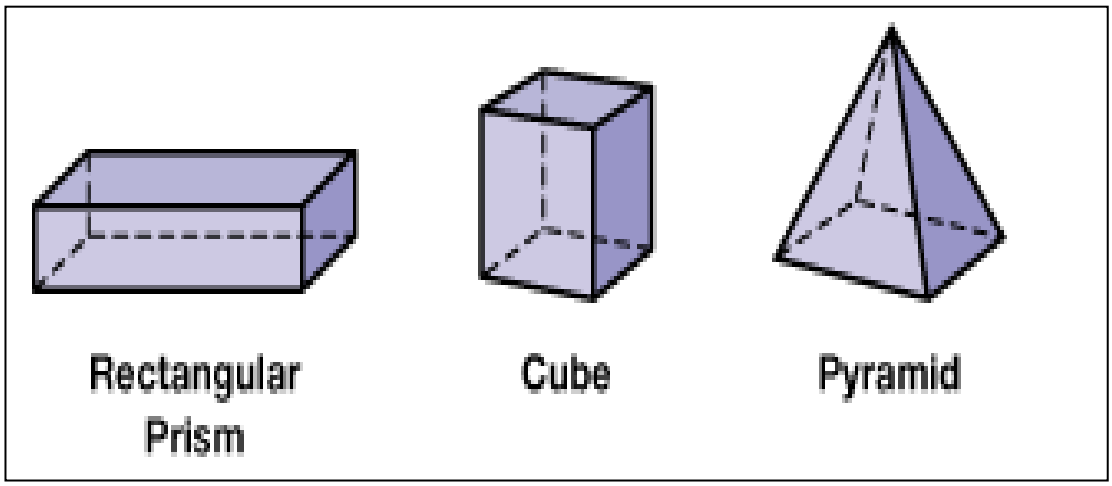



**Figure 2. Solid Figures**

Notice that the cone and cylinder have both curved and flat surfaces. Flat surfaces are called faces. The faces of the cone and cylinder are circles.

The faces of some solid figures are polygons.



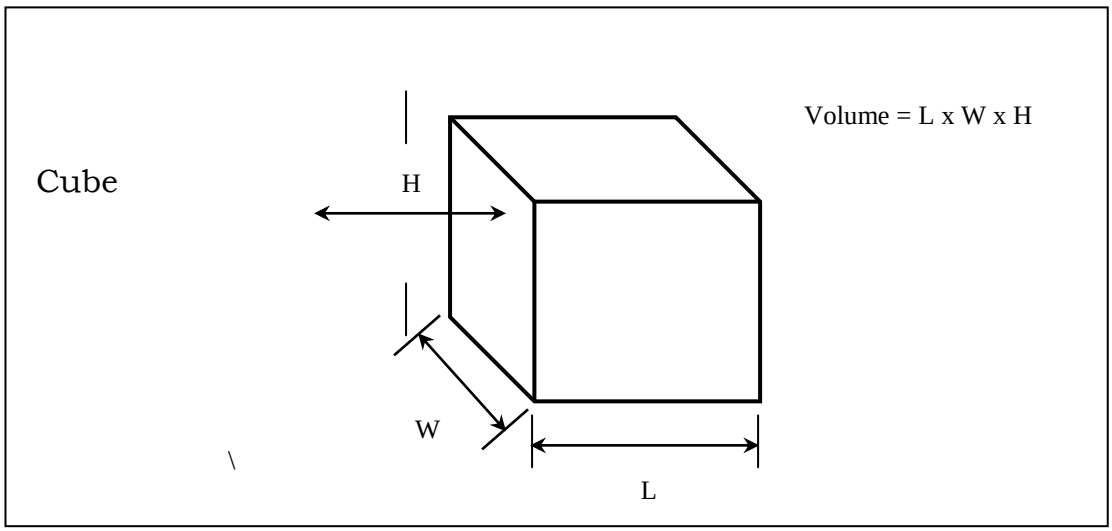
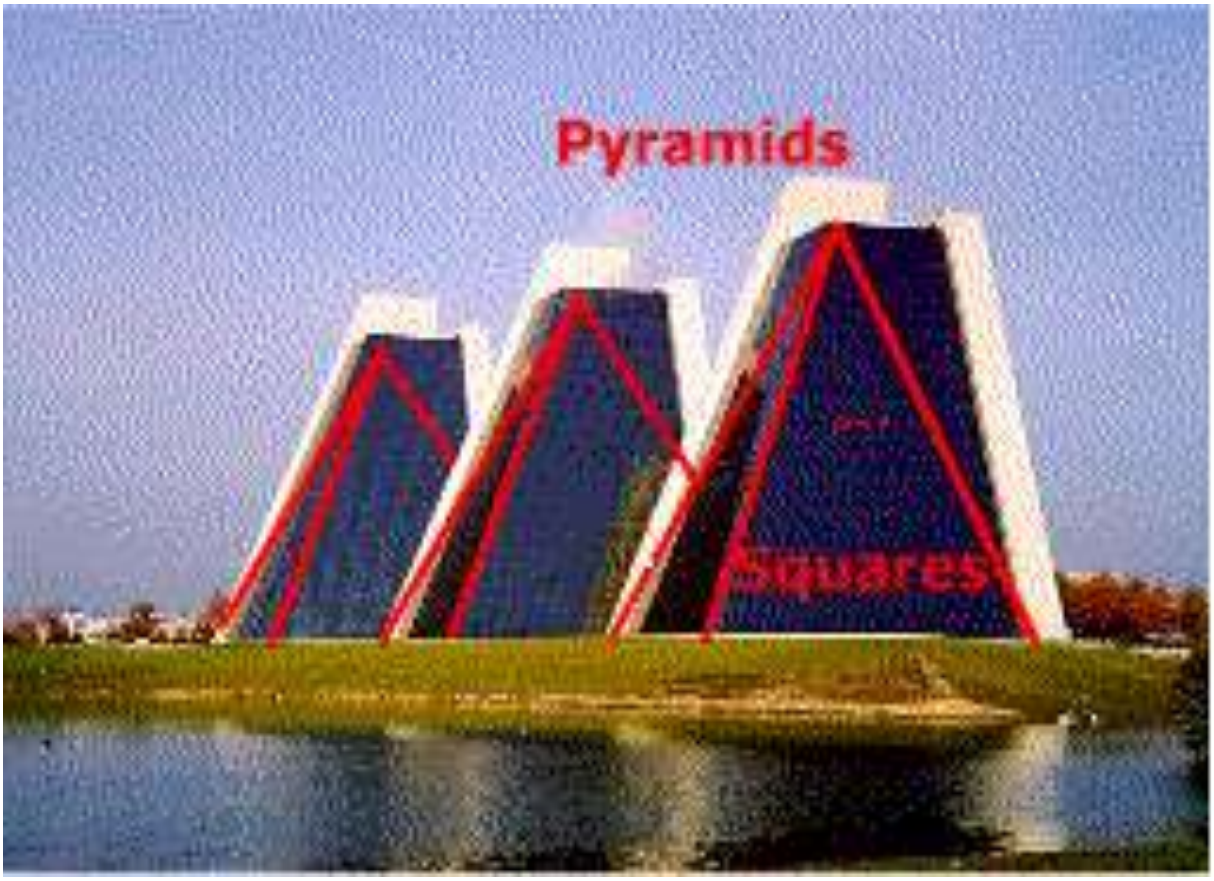
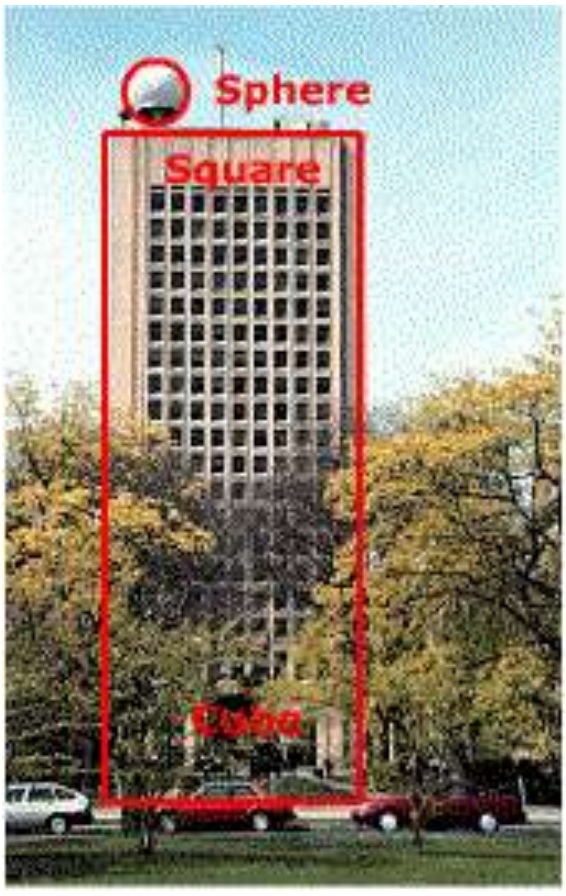




**Figure 3. Solid Figures**

Here are examples on how the world uses geometric shapes in buildings and structure.



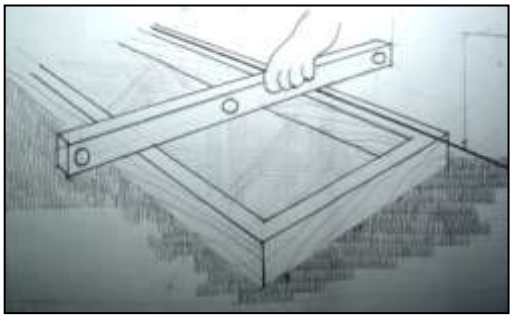



# SELECTING MEASURING INSTRUMENTS

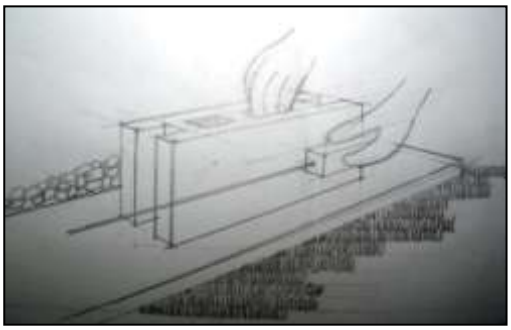
All accurate ways used for magnificent works in masonry emphasize the importance of quality and speed. In this regard, appropriate use of rulers, squares and levels allows you to layout a project accurately.

**Layout Tools**

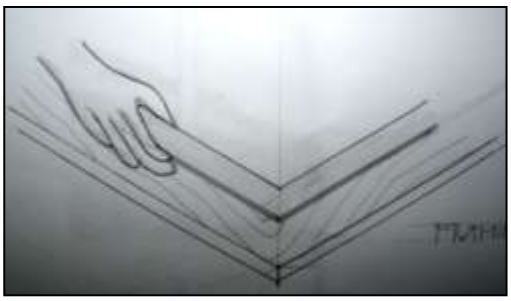
1. **MEASURING TAPE** . Instrument used to measure vertical height/depth of excavation.



2. **WOODEN BLOCK** hook onto the corner of a block and the string stretches tightly between them to serve as a guide for all of the blocks in the course.

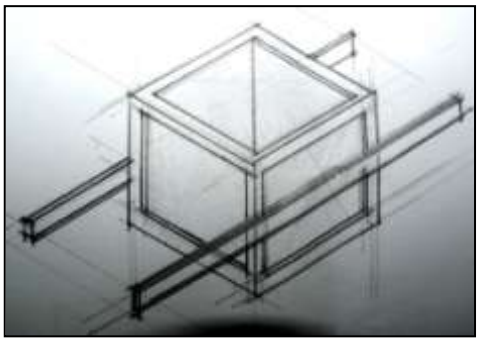


3. **MASON BLOCKS AND STRING**. String stretches tightly between them to serve as a guide for all of the blocks in the course.

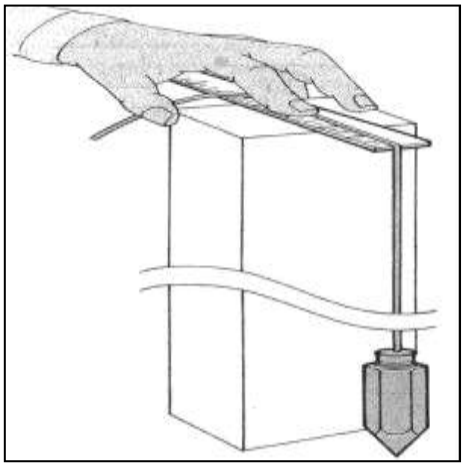


4. **FRAMING SQUARE**. Square up measurements and draw cut lines for form boards used a combination square. A framing square is handy for checking corners.

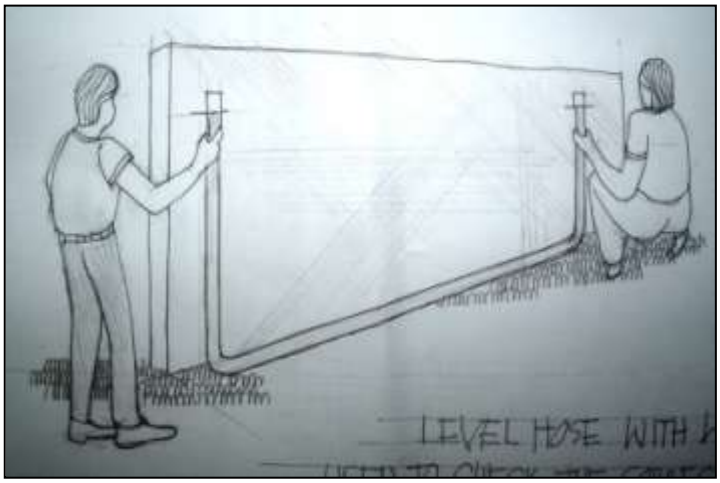
5. **CHALK LINE**. You need chalk line box to snap guideline.



6. **MEASURING BOX**. A traditional box used to measure a proportion of gravel and sand with the dimension of 12” wide; 12” in long; 12” in deep width net volume of 1 cu. Foot or 0.30 m x 0.30 m x 0.30m. Take note that these dimensions are inside the box.



7. **PLUMB BOB**. Tool used to check the correct vertical alignment of a structure.



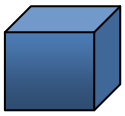

8. **LEVEL HOSE WITH WATER.** This used to check the correct horizontal alignment of a structure.

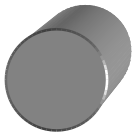
9. **BOARD OR PLYWOOD**. This serves as scaffolds and forms and supports concrete.

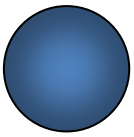
# How Much Have You Learned?

**Self-Check 2.1**

**I.** Identify the kind of geometric shape shown below. Write your answer on the blank provided.

1.  _____

2.  _____

3.  _____

4. _____

**II.** Identify the masonry measuring tools being described in each of the following sentences.

_____1. It is used to check the correct horizontal alignment of the structure.

_____2. A sharp pointed weight at the end of string gauge plumb by gravity.

_____3. Accurately indicates both level and plumb tools.

_____4. Tools used for measuring long and short distances.

_____5. A type of sheathing which is widely used for scaffolding and forming.

_____6. This is used for marking angles and larger than tri-square.

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 2.1**

**I.** The picture below is an example of architecture that has many geometric shapes within it. Can you find geometric shapes in the structure? List as many shapes as you can visualize from this structure.

**Activity Sheet 2.2**

Draw the following geometric shapes on the space provided after each item according to the requirements:

1. Rectangle. Given: L=4 cm; W=3 cm
2. Rectangular Prism. Given: L=10 mm; W=8 mm; H=6 mm
3. Cube. Given: H=5 cm; W=5 cm; L=5 cm

**Job Sheet 2.1**

**II.** This activity is a group work. Each group shall be composed of 5 members. Follow the procedure given.

**TOOLS NEEDED:**

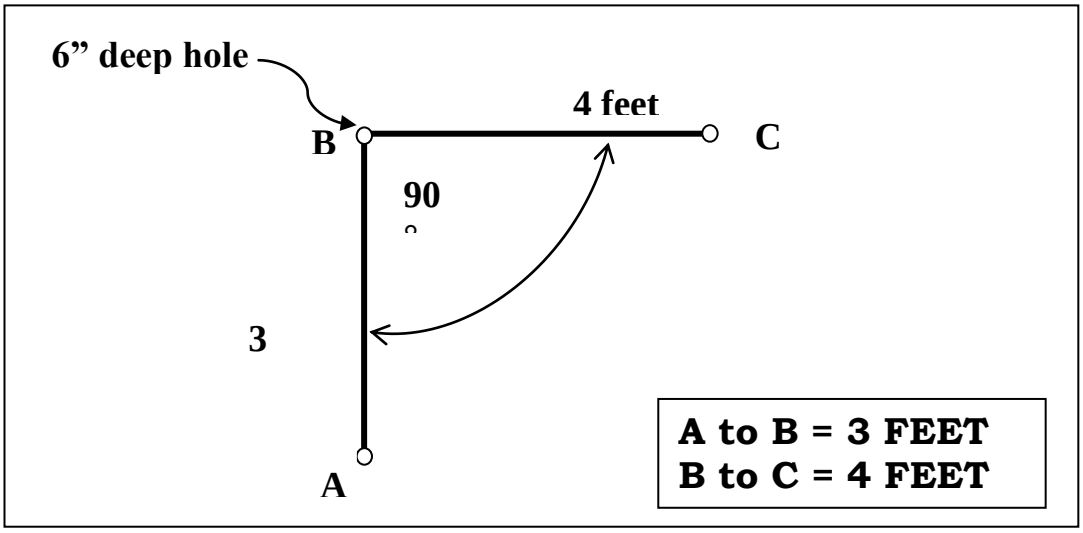
1. Hammer
2. Level
3. String Guide
4. Measuring Tape

**MATERIALS NEEDED:**

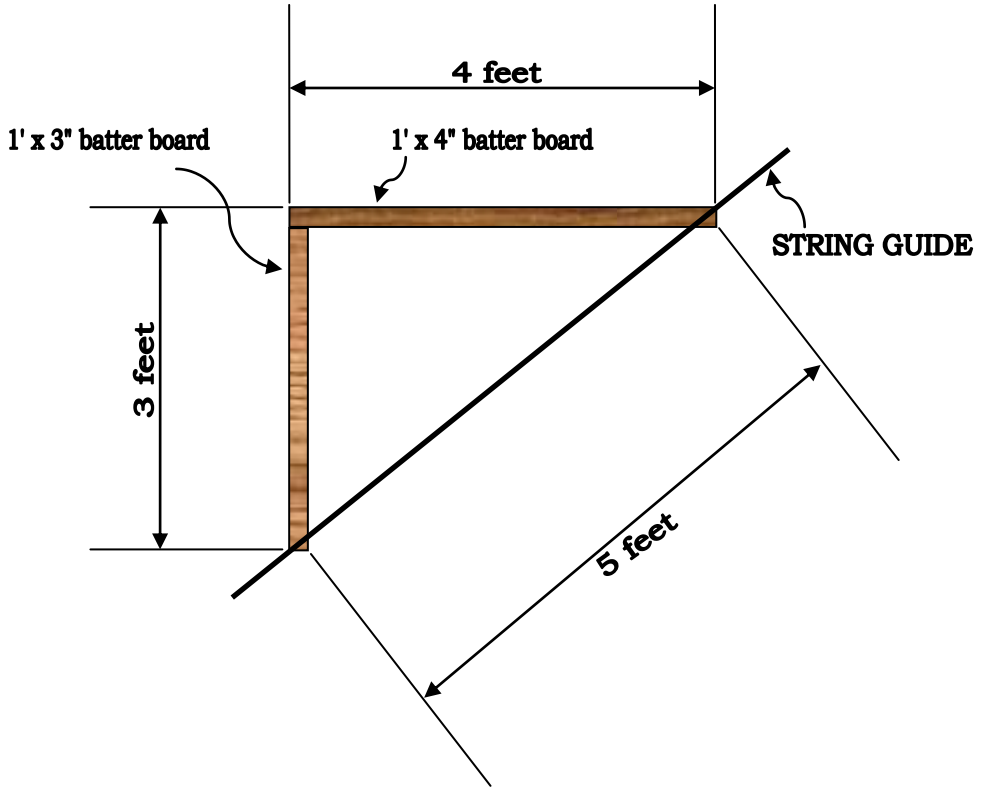
1 ½ Finishing nail
1 pc ½" x 3" x 4' S4S
1 pc ½" x 3" x 3' S4S
3 pcs. 2"x2"x18" S4S

**PROCEDURE:**

1. Layout and make staking of the ground plane surface using 2"x2"x18" S4S as post or leg and ½"x3" as batter board.
2. Dig 3 holes 6 inches deep on a flat surface making a right triangle. Follow the correct distance shown in the plan.




3. Put the 3 pcs. 2"x2"x18" S4S post or peg rigidly. See to it that they are leveled. Use any leveling instrument.
4. On top of the peg or wood post, nail or install the ½"x3" batter board. One is 3 feet in length and the other side is 4 feet in length.
5. Use string to indicate 5 feet distance on A and C direction as shown on the drawing.



# How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

Your score shall be based on the following rubric:

| | 3 | 2 | 1 |
|---|---|---|---|
| Laboratory Safety | Observes good laboratory safety procedures | Unsafe laboratory procedures observed not frequently | Practices unsafe, risky behaviors in lab |
| Tool Selection | Can select appropriate equipment and instruments to perform the experiment | Needs some guidance in selecting appropriate equipment and instrumentation | Cannot select the appropriate equipment and instrumentation required to run the experiment(s) |
| Tool Operation | Is able to operate instrumentation and process equipment | Is tentative in operation of instruments and process equipment. | Does not operate instrumentation and process equipment, does so incorrectly or requires frequent supervision |
| Accuracy of Measurement | Is aware of measurement error and is able to account for it statistically | Is aware of measurement error but does not account for it statistically or does so at a minimal level | Is unaware of measurement error |
| Designated Role Acceptance | Demonstrates the ability to assume a designated role in the group | Takes charge when not in the position to lead | Hides in the background. Participates if strongly encouraged. Does not willingly assume team roles |

# How Do You Extend Your Learning?

**Assignment Sheet 2.1**

**Directions:**

1. Take a picture of any room, building, house, or structure in your neighborhood and use different colored markers to highlight the shapes within.

2. You can also cut out the picture from a magazine.

3. Have a printed copy of the picture which includes the geometric figures you have identified.

**Congratulations! You did a great job! Rest and relax a while then move on to the next lesson. Good luck!**

## REFERENCES

**LO 1**

- Lorico, J., Neola, G.(2012), *Handout in Masonry.*
- http://www.thefreedictionary.com/structure

**LO 2**

- http://www.gwinnett.k12.ga.us/LilburnES/05-06geometry/Team2/solid_t2.html
- http://www.superstock.com/stock-photos-images/1566-0114560
- http://eduplace.com/math/mhm/3/07/index.html
- http://library.thinkquest.org/C006354/pictures.html
- http://www.ehow.com/how_5140680_write-user-manual.html
- http://www.ehow.com/how_4827020_write-user-manual-software.html

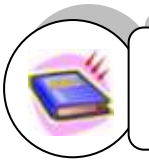
LESSON 5

# Maintain Tools and Equipment

## LEARNING OUTCOMES:

**At the end of this Lesson, you are expected to do the following:**

**LO 1. check conditions of tools and equipment;**
**LO 2. perform basic preventive maintenance; and**
**LO 3. store tools and equipment learning outcomes.**



# Definition of Terms

**Cleaning solvent** – liquid, gas, or solid used to free the object or material from unwanted element or substance

**Handheld tools** – collective term for masonry tools which are usually handy, lesser in weight and in size, and operated manually

**Lubricant** – liquid or substance applied to prevent corrosion or occurrence of unwanted element

**Lubrication** – method of applying oil or other pertinent liquid or substance to prevent or minimize occurrence of rust or unwanted element on the object or material treated
**Non-functional tools /equipment –** collective term for non-serviceable or defective tools/equipment which includes tools/equipment that cannot anymore produce or perform an accurate result according to their uses or purposes

**Preventive maintenance –** set of method or procedure performed or applied on to keep a tool or tools in good or perfect condition always that contributes to lengthening their life span or serviceable period

**Routine service –** form of maintenance regularly given to equipment and tools

**Suitability** – the act of satisfying certain requirements or specifications either in task/job performance or needs

**Synthetic** – something produced as variation or alternative from what is real or common

**Techniques** – proven procedures, approaches or methods used for a purpose of task/job accomplishment or performance

**Tips –** proven suggestions or keys given purposely to facilitate task/job performance in reduced resource utilization

# LEARNING OUTCOME 1

## Check conditions of tools and equipment

## PERFORMANCE STANDARDS

- Tools and equipment are identified according to classification/specification and job requirements.
- Non-functional tools and equipment are segregated and labeled according to classification.
- Safety of tools and equipment are observed in accordance with manufacturer's instructions.
- Conditions of personal protective equipment are checked in accordance with manufacturer's instructions.

## What Do You Already Know?

**Let us determine how much you already know about checking conditions of tools and equipment. Take this test.**

**Pretest LO 1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. How many types of tools and equipment are there in masonry?
   A. 2
   B. 3
   C. 3
   D. 4

2. Which is an advantage of the proper use of tools and equipment?
   A. Accuracy in job/task performance is achieved.
   B. Shop efficiency is promoted.
   C. There is high quality of work.
   D. All of the above.

3. Which is the best way to keep the tools in perfect condition?
   A. Keep them immediately without cleaning.
   B. Clean them while they are in the tool cabinet.
   C. Clean them before storage.
   D. Place them in a bucket of water.

4. What will happen if mortar is not cleaned?
   A. The mortar will build up and harden.
   B. The mortar will build up but can be removed too easily.
   C. The tools cannot anymore be used.
   D. Just ignore it for it won't matter anyway.

5. Most handheld masonry tools can be cleaned by___
   A. Kerosene
   B. clean water
   C. Oil
   D. Cleaning agent provided by the manufacturer

6. When do we use a muriatic acid in masonry?
   A. To harden up mortar.
   B. To remove hardened mortar on the tools.
   C. To get rid off of harmful elements from the mortar.
   D. To wash off the masonry materials.

7. What is used as preventive maintenance for wooden tools?
   A. Water
   B. Kerosene
   C. Linseed oil
   D. muriatic acid

8. Why do we have to check frequently the hammers for signs of chipping, cracking or unusual signs of defects?
   A. To assure that there are no missing tools.
   B. To ensure that they are well classified.
   C. To ensure that they are in good condition.
   D. To maintain their cost value.

9. What is the best way to prevent tools from rusting?
   A. Wipe the tools with oil.
   B. Keep the tools in an air conditioned room.
   C. Keep them in their boxes always.
   D. Keep the tools clean and dry before and while in the storage.

10. It is a method of identifying non-functional tools.
   A. Visual inspection
   B. Functionality
   C. Performance
   D. All of the above

# What Do You Need To Know?

**Read Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.**

**Information Sheet 1.1**

## TOOLS AND EQUIPMENT

Tools are defined as implements used to modify raw materials for human use. Tools can be considered as extension of the human hand thereby increasing its speed, power, and accuracy.

### I. Advantages of using the proper tools

- Efficiency of the work
- High quality of the work
- Speed of accomplishment
- Accuracy

### II. Hand Tool

A hand tool is a device or an instrument used to do a particular job that does not require a motor, but is intended for hand held operation by one individual. Virtually every type of tool can be considered a hand tool. It provides a mechanical advantage in accomplishing a physical task. Automotive hand tools are fast gaining popularity among woodworkers and craftsman.

### III. Types

There are three main types of tools/equipment in the shop. One type is known as hand tools because your hand supplies the energy to operate them. The other type is called machine or power tools/equipment which uses either electricity, compressed air, or hydraulic pressure to make them operate. The last type is referred to as measuring tools.

- ***Manual Hand Tools***: Manual hand tools are the most basic form of equipment. They do not require the speed of powered hand tools or do not have access to power sources but are perfect for operations. These include hoes, screwdrivers, chisels, wedges, drift pins, hammers and others.

- ***Pneumatic Hand Tools***: Pneumatic hand tools perform the operation task at the push of a lever. They are powered by compressed air. They include chippers, drills, hammers, sanders etc.

- ***Power Hand Tools***: Tools which are hand held but are powered by electricity. These include chainsaws, high grade motors, electric drills, angle grinders, jigsaw cutters, tappers, and fasteners.

## IV. Masonry Tools and Equipment

1. **TAMPER.** The tamper tool is used in masonry for pressing exposed aggregate into concrete and also compact the soil before pouring concrete. It is usually in the shape of a long or short handle attached to a flat blade surface. When imprinting concrete with texture mats or skins, this tool is used to securely tamp down the mat and ensure a good outlook.

2. **STRAIGHTEDGES.** Straightedges are used to strike off or remove freshly placed concrete and make the surface as level as possible before finishing. Straightedges are made of various metals like aluminum, magnesium and even wood. They are available in various lengths and cross sections.

3. **FLOATS.** Floats are widely used in masonry jobs. The main purpose of using floats is to fill voids, level ridges, and smooth the surface in preparation for troweling. The tool can also be used to work in dry-shake color hardener. It can also be used to bring paste to the surface by pushing down the coarse aggregate. Most floats for decorative concrete work are made of aluminum, magnesium, or wood. Less common float materials are rubber, stainless steel, and laminated wood or canvas resin. There are bull floats for working in large areas of concrete. They are usually 8 inches in width and 3 to 10 feet in length. There are hand floats in length from 12 to 24 inches and in width from 3 to 5 inches. Most floats are available with rounded or square ends. Round-end floats are perfect in tight corners and help to minimize lap marks.

**a. Bull Float**

**b. Hand Float**

4. **FRESNO.** Fresno trowels are designed in such a way that they are attached to long extension handles so that masons don't have to walk out on the slab. Fresnos are efficient in rapid work over large areas, like driveways. However the only drawback is that do not achieve the same degree of compaction that can be achieved with hand trowels. However, that can be also be considered as an advantage when you must trowel slabs early for decorative work. In this way they can create a smooth finish without premature sealing of the surface. Fresnos are available in blue, stainless, or high-carbon steel, with rounded or square ends. But they come in longer lengths ranging from 2 to 4 feet.

5. **EDGERS.** Edgers are important masonry tools used to produce a clean edge along joints in concrete. It can also be used to produce a clean edge along the slab perimeter. Edgers help in creating a neat, rounded edge that is less prone to chipping or spalling. They are available in varied sizes. The general size range from 1 1/2 to 6 inches wide and 6 to 10 inches long. There is a lip on one side of the tool which is actually the edge and it ranges from 1/8 inch to 2 inches in radius and its depth is from 3/8 inch to 1 1/2 inches.

6. **GROOVERS.** Groovers as masonry tools are used to tool control joints in plastic concrete. They are made of bronze or stainless steel. They have a V-shaped bit that is used to cut the groove. They come with wood or comfort-grip handles like edgers that are available in various sizes ranging from 2 to 8 inches wide and 3 to 10 inches long, but the most common groover size is 6 inches long and 4 1/2 inches wide. Bi-directional groovers have double-end bits that can help in cutting forward or backward.

**7. TROWEL**

There are different kinds and sizes of trowels. The blade should be made of forged steel to last longer. Handles are generally made of plastic or wood. Blades vary from 9 to 12 inches in length and 4 to 7 inches in width. The larger rowels are used for spreading mortar. A variety of smaller trowels are used repairing old mortar joints and scraping off excess mortar. A trowel that you feel comfortable with can be used to do all of the above; however, you will need a separate tool to finish the mortar joints.

**HOLDING THE TROWEL**

Learning to hold the trowel correctly is important and will make the job easier. Gripping the handle with four fingers and putting the thumb on top of the metal band (ferrule) on the handle is how most masons hold a trowel.

**LOADING THE TROWEL**

Learning how to load a trowel with mortar is a skill to develop. Some people like to fill the trowel by cutting mortar from the top. Some will load the trowel with mortar by cutting from the front, while others load by cutting mortar from the side. Your comfort level will dictate your style. Once the trowel is loaded, you must settle the mortar on the trowel by snapping your wrist. This keeps the mortar from slipping off the trowel, especially when you are buttering head joints. The head joint is the joint that runs up and down the block vertically. The bed joint is the one that runs along the top of the block horizontally.

When laying the mortar on the block, line the mortar side of the trowel on the side of the block. In one quick motion, slide the trowel down, using the side of the block as a guide (the trowel should lightly scrape along the side of the block in downward motion).

8. **MASON'S HAMMER.** This tool is used for hammering nails and for splitting block or brick with the other end. One end is square and flat and is used like a hammer. The other end is sharp, like a small chisel. The sharp chisel-end is used to make a cutting line around the masonry to be splitted. Light blows with the chisel-end all the way around the block or brick and then a sharp blow with the hammer end will give a clean cut.

   The chisel-end is then used to take off any burrs or pieces which have not been broken off cleanly. The mason's hammer can become dangerous if not properly used. Chips can fly off the masonry being cut and injure the face and eyes. ALWAYS USE GOGGLES WHEN SPLITTING MASONRY.

9. **BLOCKING CHISEL.** If there are more than just a few blocks or bricks that need to be split, and very clean cuts are required, then a blocking chisel should be used. This is a heavier, wider chisel, up to 8 inches wide. It comes in a variety of sizes and shapes. These chisels are made of steel and are used by holding the small end and striking the end with a heavy mashing hammer, mallet or sledge hammer. This will give a clean cut with usually just one blow.

10. **MASHING HAMMER.** A mashing hammer is used to strike the chisel when cutting block. It is not recommended to use a mason's hammer to strike the chisel since the tempered steel might split and a piece fly off. A mashing hammer has two striking ends and will weigh from two to four pounds.

11. **MASONRY POWER SAW.** If you are cutting large quantities of block or brick, you may want to use a masonry power saw. The two basic types of saws are either hand-held or table saws. The hand-held saws usually have a silicon blade about 6" or 7" high and, therefore, will not give a clean cut all the way through an 8" block. But a hand-held saw is much quicker and gives a cleaner cut rather than working with a chisel and hammer.

    A table-mounted saw with an electric motor is always used when there is a lot of cutting. Blades are normally 14" to 20" high and will cut through any kind of masonry block or brick, especially if the blade is made of industrial diamonds.

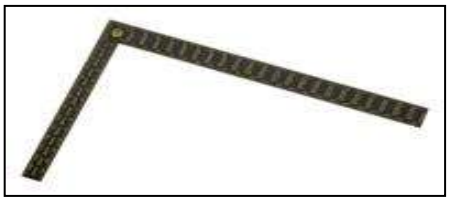
    A dry cut can be made with a silicon-carbide blade, bonded with reinforced mesh. However, dry cutting throws out a lot of dust and a dust mask or respirator must be worn.

    Next to the trowel, the level is the second most important tool to have when building a wall. A good level is lightweight and absolutely straight. The better levels are called spirit levels because they contain alcohol in the vials instead of oil. Alcohol is more accurate to use.

12. **LEVELS.** The purpose of the level is to keep the work at hand in accurate position whether vertical, across, or horizontal. A good level usually has 6 vials installed strategically: two at the center, while the others at both ends distributed equally. The bubble should line up between the two red or black lines in order to achieve straightness or levelness. If laid on more than one block at a time, the level may cover, the very least, about 36 inches long, depending on the level length because some are up to 48 inches. Since most blocks are 16 inches long, use levels from 18 to 24 inches.

13. **MASON'S LINE.** In order to have an easier time laying a straight wall, a mason's line is recommended. Use nylon or Dacron line that is stretched between two corners of the wall you are building. A mason's line will let you build walls without bulges or hollows. It is placed very close to the block you are laying, but give enough room in order for you to swipe off the excess mortar without disturbing it.

14. **STEEL SQUARE.** When laying walls, make sure the corners are at a 90 degree angle, assuming you are building a square or a rectangle wall. A large steel square usually 24 inches long should be used for marking and checking the corners being built.



15. **JOINTERS.** A jointer is used to finish a mortar joint after it becomes hard enough so that a finger print will be seen in the mortar once pressed. Jointers come in many sizes and shapes, but typically for blocks, you will use a sled jointer to create a 3/8th inch joint for long horizontal joints. For vertical or head joints which are 8 inches high, use a smaller jointer. Jointers are shaped to give a variety of indentations depending on the preference. The most popular are the V joint and the half-rounded joint (concave joint). These two kinds of joints help shed water better than any other kind of joint. If you are using clay brick, or other brick products, use a jointer made specifically for bricks.

16. **CHALK LINE.** A chalk line comes in a metal or plastic case, with a cotton line coming out of one end. As the line is pulled out, it passes through a fine chalk powder, usually blue or red. When this line is stretched between two points and snapped, it will leave an imprint on the surface being snapped. A chalk line is used for laying out a block wall on a concrete foundation to get the alignment correct.

17. **BRUSHES.** After a wall is built, there may be some mortar stains or powder residue on the wall. Before cleaning solutions are used, these marks can often be brushed off. A variety of brushes are available. Powder residue can be brushed off with a

medium soft bristle brush. A light accumulation of mortar could be brushed with a stiff bristle brush. An abrasive stone or piece of same block or brick after testing in an obscure area may serve the purpose. Stains that do not respond to brushing should be cleaned with a special solution and brushing with a stiff bristle brush. Watering the wall before and after washing and brushing is necessary so that the solution will not be absorbed.

18. **MIXING TOOLS.** On small jobs, do not use a powered mortar mixer. Several tools are needed to mix mortar. The regular shovel with a square edge will be needed to proportion materials. The large hoe with two holes in the blade is used to mix the mortar sand, masonry cement and water. The holes in the blade make it easier to pull the hoe through the mix and to break up the lumps.

    You will also need either a mortar box or wheel barrow to mix the mortar and a bucket to measure water to be added to the mixture. Mortar boxes are usually made of heavy gauge plastic or steel. Once the mortar is mixed, transfer the mortar to a mortar board or hawk, from which you will work when applying the mortar.

## V. Non-Functional Tools and Equipment

It is highly recommended that you must inspect all the tools, instruments and equipment before using them to ensure that they are used to specification. Avoid using defective hand tools and equipment to prevent accidents.

## VI. Methods of Identification

1. ***Visual inspection****.* It refers to the visual observation of an expert on the appearance of the tools and equipment.
2. ***Functionality****.* Vibration or extra noise from the operation means problems on parts and accessories started to develop.
3. ***Performance****.* When there is something wrong with the performance of either hand tools or equipment they need an immediate repair or maintenance.
4. ***Power supply*** *(for electrically operated equipment).* Failure to meet the required power supply, malfunction will occurs in the part of hand tools or equipment.
5. ***Person's involved****.* It refers to the technical person who has the knowledge and skills about the technology.

## VII. Safety Practices

1. Always check the tools/instrument and equipment before using.
2. Use the appropriate materials, tools, instrument and equipment as per job or task requirement.
3. Always wear personal protective equipment like gloves, goggles, hard hat and others, at all times.
4. Wait for the final instruction before doing the job or task.
5. Report to the person in authority whenever untoward incident happens.

## VIII. Personal Protective Equipment at Work

PPE is described in the previous module as the Personal Protective Equipment which includes clothing affording protection against the weather. It is intended to be worn or held by a person at work to protect him against one or more risks to his health and safety.

Furthermore, PPE includes equipment such as safety footwear, hard hats, high visibility waistcoats, goggles, life jackets, respirators and safety harnesses.

## XI. Suitability of PPE

To be able to choose the right type of PPE, the hazards involved in the task or work environment must be considered carefully. PPE must also meet the needs of the individual.

The following factors should be considered in assessing the suitability of PPE:

- is the PPE appropriate for the risk involved and conditions at the place where exposure may occur? e.g. goggles are not suitable when full-face protection is required
- does the PPE prevent or adequately control the risks involved without increasing the overall risk? e.g. gloves should not be worn when using a pillar drill, due to the increased risk of entanglement
- can the PPE be adjusted to fit the wearer correctly? e.g. if a person wears glasses, ear defenders may not provide a proper seal to protect against noise hazards
- has the state of health of those using it been taken into account?
- what are the needs of the job and the demands it places on the wearer? How long will the PPE need to be worn? What are the requirements for visibility and communication?
- if more than one item of PPE is being worn, are they compatible? For example, does a particular type of respirator make it difficult for eye protection to fit properly?

## HAZARDS AND TYPES OF PPE TO BE USED

### 1. EYES

*Hazards:* chemical or metal splash, dust, projectiles, gas and vapor, radiation.

*Options:* Use safety spectacles, goggles, face shields, visors.

### 2. HEAD

*Hazards*: impact from falling or flying objects, risk of head bumping, hair entanglement.

*Options*: Use a range of helmets and bump caps.

### 3. BREATHING

*Hazards*: dust, vapor, gas, oxygen-deficient atmospheres.

*Options*: Use disposable filtering face piece or respirator, half- or full-face respirators, air-fed helmets, breathing apparatus.

### 4. PROTECTING THE BODY

*Hazards*: temperature extremes, adverse weather, chemical or metal splash, spray from pressure leaks or spray guns, impact or penetration, contaminated dust, excessive wear or entanglement of own clothing.

*Options*: Use conventional or disposable overalls, boiler suits, specialist protective clothing, e.g. chain-mail aprons, high-visibility clothing.

### 5. HANDS AND ARMS

*Hazards*: abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, skin infection, disease or contamination.

*Options*: Use gloves, gauntlets, mitts, wrist cuffs, armlets.

### 6. FEET AND LEGS

*Hazards*: wet, electrostatic build-up, slipping, cuts and punctures, falling objects, metal and chemical splash, abrasion.

*Options*: Use safety boots and shoes with protective toe caps and penetration-resistant mid-sole, gaiters, leggings, spats.

## MAINTENANCE

### I. Training

Make sure anyone using PPE is aware of its importance, when it is to be used, repaired or replaced and its limitations. Train people how to use it. Check regularly that PPE is being used. Safety signs can be useful reminders to wear PPE.

### II. Maintaining PPE

An effective maintenance system for the PPE is essential to ensure the equipment continues to provide the degree of protection for which it is designed. Therefore, the manufacturer's maintenance schedule (including recommended replacement periods and shelf lives) must always be followed.

Maintenance may include; cleaning, examination, replacement, repair and testing. The wearer may be able to carry out simple maintenance, but more intricate repairs must only be

carried out by competent personnel. The costs associated with the maintenance of PPE are the responsibility of the employer.

### III. Using Working Tools and Equipment Safely

Every year, there are a number of accidents from using work equipment, including machinery. Many are serious and some are fatal. Accidents not only cause human suffering, they also cost money, for example in lost working hours, training temporary staff, insurance premiums, fines and managers' time. By using safe, well-maintained equipment operated by adequately trained staff, you can help prevent accidents and reduce these personal and financial costs.

People using concrete and masonry tools and equipment face a wide range of hazards. Most at risk are operators of hand-held concrete and masonry saws. Information, instruction, training and supervision are essential in all concrete and masonry operations.

### IV. Risks from Using Tools and Equipment

Many things can cause risks, for example:

- using the wrong equipment for the job, using ladders instead of access towers for an extended job at high level.
- not fitting adequate guards on machines, leading to accidents caused by entanglement, shearing, crushing, trapping or cutting.
- not fitting adequate controls, or the wrong type of controls, so that equipment cannot be turned off quickly and safely, or starts accidentally.
- not properly maintaining guards, safety devices, controls etc so that machines or equipment become unsafe.
- not providing the right information, instruction and training for those using the equipment.
- not maintaining work equipment or carrying out regular inspections and thorough examinations.
- not providing the personal protective equipment needed to use certain machines safely, e.g. chainsaws, angle grinders.

## RISK REDUCTION

### Safety and Maintenance Practices

- ***Use the Right Tool for the Job.*** Using the correct tool for the job is the first step in safe hand tool use. Tools are designed for specific needs. To avoid personal injury and tool damage, select the proper tool to do the job well and safely.
- ***Take care of and treat with respect quality professional hand tools*** to make them last many years. Manufacturers design tools for specific applications Use tools only for their intended purpose.
- ***Use Well-Designed, High-Quality Tools.*** Investing high-quality tools makes the professional's job safer and easier. Well-designed tools save time, give professional results and help you do your job more safely.
- ***Make sure machinery is safe.*** You should check the machinery if it is suitable for the work. Think about how and where it will be used. If you think that machinery you have bought is not safe DO NOT USE IT. Contact the manufacturer to discuss your concerns.

- ***Keep all tools in good condition with regular maintenance***. Install or repair equipment only if you are qualified. A faulty job could cause serious injuries from mechanical failure, fire, or shock. Maintain tools in proper working condition.
- ***Examine each tool for damage before use***. Regularly inspect tools, cords and accessories. Repair or replace problem equipment immediately. Never alter a tool in a manner that reduces its effectiveness or safety.
- ***Operate according to the manufacturer's instructions***. Most equipment comes with guidelines for maintenance, including advice on how to carry out equipment checks safely.

Always remember, safety is essential to good job performance. Pay attention to what's going on around you, be flexible, and adapt to changing conditions. Think before you react, and keep your head in the game.

Think about tool safety each and every time you begin a job, and you'll perform your job safely and effectively. Treat your tools as carefully as you treat your hands.

## How Much Have You Learned?

**Self-Check 1.1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. How many types of tools and equipment are there in masonry?
   A. 2
   B. 3
   C. 4
   D. 5

2. It is a device or an instrument used to do a particular job that does not require a motor.
   A. Manual Tool
   B. Power Tool
   C. Masonry Tool
   D. None of the above

3. This tool is efficient for rapid work over large areas like driveways.
   A. Bull Float
   B. Hand Float
   C. Fresno
   D. Edger

4. Which is a safety practice?
   A. Always check the tools/instrument and equipment before using.
   B. Use the appropriate materials, tools, instrument and equipment as per job or task requirement.
   C. Always wear personal protective equipment like gloves, goggles, hard hat etc., at all times.
   D. All of the above.

5. Which is a PPE?
   A. safety footwear
   B. hard hats
   C. high visibility waistcoats
   D. All of the above

6. It is a method of identifying non-functional tools.
   A. Visual inspection
   B. Functionality
   C. Performance
   D. All of the above

7. It is a method of identifying non-functional tools.
   A. Visual inspection
   B. Functionality
   C. Performance
   D. All of the above

8. What do we consider in choosing the right type of PPE?
   A. hazards in the task or work environment
   B. a cloudy sky
   C. floody ground
   D. complexity of work

9. Which will you use to protect yourself from chemical or metal splash?
   A. bumb caps
   B. safety spectacles
   C. full-face respirators
   D. breathing apparatus

10. How is the PPE maintenance done?
   A. cleaning
   B. examination
   C. replacement
   D. Any of the above

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 1.1**

**I.** Given below are pictures of tools/equipment. Identify and classify them according to types.

| | **Name of Tool/equipment** | **Type** |
|---|---|---|
| 1.1 | | |
| 1.2 | | |
| 1.3 | | |
| 1.4 | | |
| 1.5 | | |

1.6

1.7

1.8

1.9

1.10

**Activity Sheet 1.2**

**II.** Explain briefly below the difference between Functional tools and Non-Functional Tools.

**Activity Sheet 1.3**

**III.** This is a group work. With the tools stored in the shop cabinet, segregate functional from non-functional by type. Arrange them properly. Then, prepare an inventory of these tools. When done, submit the list to your teacher for evaluation and rating.

**Activity Sheet 1.4**

**IV.** Directions: The name of this game is a Safety Word maze. In this activity you will identify important safety terms.

1. Find out the six (6) hidden words and encircle them.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T | S | C | S | V | S | D | F | G | H | J | K |
| R | A | D | Q | U | L | Z | O | X | C | V | P |
| M | F | F | U | K | R | E | P | A | I | R | U |
| A | E | X | A | M | I | N | E | I | O | P | R |
| C | T | H | L | M | L | T | R | Y | U | I | P |
| H | Y | U | I | P | O | U | A | L | W | E | O |
| I | N | S | T | R | U | C | T | I | O | N | S |
| N | I | O | Y | E | S | M | E | M | J | K | E |
| E | M | P | A | V | U | O | P | Z | C | V | B |
| R | N | V | I | E | H | A | Z | A | R | D | N |
| Y | X | B | I | N | W | S | A | I | H | G | F |
| L | Z | A | N | T | Y | U | O | P | A | A | D |

2. For each of the words found in the box, write a sentence about safety using that word (Example: Safety is everyone's responsibility). Write your sentences below:

## How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

If you got in the Wordmaze:

- 9 or more safety terms and were put in sentences correctly, CONGRATULATIONS! You are already competent on safety shop practices;
- 7 to 8 safety terms and were put in sentences correctly, you need to study a bit harder;
- below 7 safety terms and were put in sentences correctly, you need to review your relevant notes and consult your teacher for some important inputs.

## How Do You Extend Your Learning?

**Assignment Sheet 1.1**

### I. Activity: Hazards in the workshop

In this activity you will learn to identify unsafe practices when using tools and equipment. Recognize the risk involved and suggest safe working practices.

The photos below show students involved in unsafe practices in a shop room. Answer the following questions by analyzing each picture:

1. What is the unsafe behavior of the student?
2. What is the possible risk?
3. What should be the correct behavior to avoid injuries or accidents?

| | |
|---|---|
| 1. | The unsafe behavior is<br>_____<br>The risk to the student or others is<br>_____<br>To avoid injury/accident, the student should<br>_____<br>_____ |

| | |
|---|---|
| 2. | The unsafe behavior is<br>_____<br>The risk to the student or others is<br>_____<br>_____<br>To avoid the injury/accident, the student should<br>_____ |
| 3. | The unsafe behavior is<br>_____<br>The risk to the student or others is<br>_____<br>_____<br>To avoid the injury/accident, the student should<br>_____ |
| 4. | The unsafe behavior is<br>_____<br>The risk to the student or others is<br>_____<br>_____<br>To avoid the injury/accident, the student should<br>_____ |
| 5. | The unsafe behavior is<br>_____<br>The risk to the student or others is<br>_____<br>_____<br>To avoid the injury/accident, the student should<br>_____ |

**Assignment Sheet 1.2**

## II. Risk Assessment Activity

1. Figure 1. Shows clearly a hazardous workspace.

1.1. Encircle three unsafe uses of hand tools and materials.

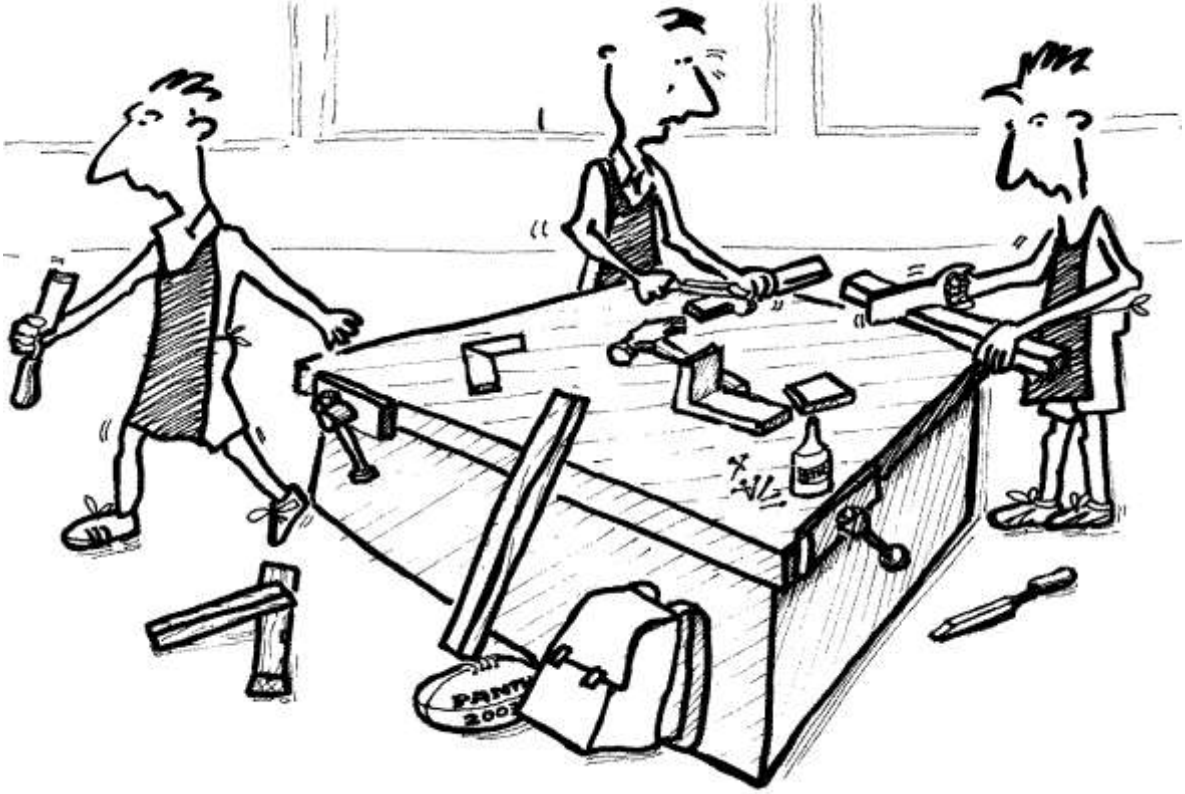


Figure 1. Hazardous workspace

1.2 How could you avoid the three hazards above?

Hazard 1 _____
Hazard 2 _____
Hazard 3 _____

1.3 Discuss the type of injuries that could occur due to the hazards identified.

1.4. In small groups, look at all the potential hazards in Figure 1 and rank them in order of the least dangerous to most dangerous. Your group needs to indicate why they chose this particular order.

# LEARNING OUTCOME 2

**Perform basic preventive maintenance**

## PERFORMANCE STANDARDS

- Lubricants are identified according to types of equipment.
- Tools and equipment are lubricated according to preventive maintenance schedule or manufacturer's specifications.
- Tools are cleaned and lubricated according to standard procedures.
- Defective equipment and tools are inspected and replaced according to manufacturer's specification.

## What Do You Already Know?

**Let us determine how much you already know about the use farm tools and equipment. Take this test.**

.

**Pretest LO 2**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which is the best way to keep the tools in good condition?
   A. Keep them immediately without cleaning.
   B. Clean them while they are in the tool cabinet.
   C. Clean them before storage.
   D. Place them in a bucket of water.

2. Most handheld masonry tools can be cleaned by___
   A. Kerosene
   B. clean water
   C. Oil
   D. Cleaning agent provided by the manufacturer.

3. When do we use muriatic acid in masonry?
   A. To harden up mortar.
   B. To remove hardened mortar on the tools.
   C. To get rid off of harmful elements from the mortar.
   D. To wash off the masonry materials.

4. What is used as preventive maintenance for wooden tools?
   A. Water
   B. Kerosene
   C. Linseed oil
   D. muriatic acid

5. Why do we have to check frequently the hammers for signs of chipping, cracking or unusual signs of defects?
   A. To assure that there are no missing tools.
   B. To ensure that they are well classified.
   C. To ensure that they are in perfect condition.
   D. To maintain their cost value.

6. What is the best way to prevent tools from rusting?
   A. Wipe the tools with oil.
   B. Keep the tools in an air conditioned room.
   C. Keep them in their boxes always.
   D. Keep the tools clean and dry in the storage.

7. What is the best way to prevent tools from rusting?
   A. Wipe the tools with oil.
   B. Keep the tools in an air conditioned room.
   C. Keep them in their boxes always.
   D. Keep the tools clean and dry before and while in the storage.

8. Which is an advantage of the proper use of tools and equipment?
   A. Accuracy in job/task performance is achieved.
   B. Shop efficiency is promoted.
   C. There is high quality of work.
   D. All of the above.

9. What will happen if mortar is not cleaned off from the tools?
   A. The mortar will build up and harden.
   B. The mortar will build up but can be removed too easily.
   C. The tools cannot anymore be used.
   D. Just ignore it for it won't matter anyway.

10. What do you do when a wooden handle needs to tighten up?
   A. Ignore it.
   B. Tie it around with a rope or a tie wire.
   C. Insert another wedge or immerse the hammer head into the bucket of water overnight.
   D. Bring it immediately to the carpenter for repair.

# What Do You Need To Know?

**Read Information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1.**

**Information Sheet 2.1**

## BASIC LUBRICATION

Lubricant reduces friction between moving metal surfaces. It coats surfaces and resists being displaced by the pressure, keeping the metal parts separated. Lubricants also prevent corrosion, block contaminants and can serve as a coolant. A good lubricant flows easily under pressure and remains in contact with moving surfaces.

**Types of Lubricants**

1. **Oils** cover a broad class of fluid lubricants which has particular physical properties and characteristics. Petroleum oils (mineral oils) are made from naphthenic or paraffinic oils. Naphthenic oils contain little wax and their low pour point makes them good lubricants for most applications. Paraffinic oils are very waxy which makes them useful for hydraulic equipment and other machineries.

2. Greases are ideal for lubricating bearings, gaskets, seals and other moving parts. It consists of oil or synthetic fluid (~80%), a thickening agent (~10%) and additives (~10%). The consistency of greases is usually ranked by their relative hardness on a scale set by the National Lubricating Grease Institute (NLGI). The softest greases are rated at 000 (which is a flowing liquid) with higher numbers indicating harder grease. Most grease falls in the range between 1 and 4.

3. **Solid lubricants** are usually fine powders, such as Molybdenum Disulfide (Moly), graphite and Teflon® (PTFE). They can be used alone, or as additives in grease or dispersions, or as dry film bonded lubricants. Lubricating solids can last longer than unfortified oils and greases because of their ability to form burnished films on surfaces.

4. **Rust remover** is used mainly to dissolve rust. It is also use as an excellent cleaner. For example, to remove a rusted bolt, spray remover directly on the bolt, wait for approximately five minutes and unscrew. For a bicycle chain, apply the rust remover to clean the chain, and then apply a thick lubricant (oil or PL-100). Another useful trick, try it to remove stuck-on store labels. It works perfectly and won't harm glass or plastic. WD-40 and Release All are two of the many brands of rust removers on the market.

- **Dry lubricant** is a greasy product that dries in a few minutes and leaves a protective film. Since it dries rapidly, it doesn't attract dust, so there is no mess. It is recommended to be used on rubber, car door gaskets, handsaws, mitre saw, saw sliders, window sashes, and others. It can also be used on balky wooden drawers, but cabinet makers usually prefer floor wax because it is more durable. JIG-A-LOO is the common brand of a dry lubricant.

Locksmiths also use a dry lubricant, graphite, to free stuck door locks. This product should be applied sparingly into the keyhole, as it is very messy. Graphite lubricant is composed of a fine black powder that no cleaner can remove, so it is wise to protect the door when graphite is applied.

- **Penetrating lubricant.** Its lubricating properties persist even after having removed residues, as it penetrates into metal. It is ideal for door hinges, even the fridge, hard to open pliers, ski bindings and others as it does not hold dirt and dust. The PL-100 is thick and very efficient.

- **Synthetic lubricants** cover a broad category of oils, greases, and pastes of varied properties. Synthetic lubricants are more inert, generate less waste, are capable of a wider range of temperatures and have a longer life than petroleum materials. They are even applicable to elastomers, seals and O-rings.

  - ✓ Synthetic oils are used to lubricate instrument bearings, hydraulics, air compressors, gas and steam turbines and other applications. They have excellent viscosity temperature characteristics, good resistance to oxidation and an extremely wide operating temperature range.

  - ✓ Synthetic greases can last a lifetime, making them very cost-effective. They are chemically inert, and their high thermal stability makes them useful for aerospace, electrical, automotive and other high-tech or industrial applications. Some of these lubricants keep their viscosity in temperatures ranging as high as 550° Fahrenheit and are nonflammable up to 1,200° Fahrenheit.

- **Silicones** are very stable and very inert lubricants, which provide a wider range of operating temperatures than non-silicone synthetic lubricants. Other advantages include water repulsion and electrical insulation. Flourosilicones have higher resistance to harsh environments and the ability to carry bearing loads. Lubricant manufacturers can provide technical data sheets on their products to advise you on the best applications of each type of lubricant.

## KINDS, USES AND PROPERTIES OF CLEANING SOLVENTS

### Kinds of Cleaning Solvents

Solutions are homogeneous mixture of two or more components; can be gaseous, liquid or solid. When we speak of a solution, we usually think of a solid dissolved in water. While water is the most common solvent, other liquids are frequently employed as solvents for certain substances. The dissolved material in a solution is termed as solute (e.g. wax) while the dissolving medium is called solvent (e.g. gasoline). However, the term can be interchanged depending on which substance is of greater amount.

Solvent is a component of a solution that dissolves solute and is usually present in large proportion or amount. It can be classified as polar or non-polar. Polar solvents are solvents which dissolve/are soluble in water; while non-polar solvents are solvents which do not dissolve/are insoluble in water.

Solvents are usually used for cleaning in automotive shops like water, gasoline, kerosene, thinner and detergent soap.

The table below shows the kinds of cleaning solvent based on their solubility in water.

| Cleaning Solvents | Solubility in Water | Polar | Nonpolar |
|---|---|---|---|
| a. water | soluble | x | |
| b. gasoline | insoluble | | X |
| c. kerosene | insoluble | | X |
| d. thinner | insoluble | | x |
| e. detergent soap | soluble | x | |

**Properties of Cleaning Solvents**

A useful generalization much quoted is that "Like dissolves like". More specifically, high solubility occurs when the molecules of the solute are similar in structure and electrical properties to the molecules of the solvent.

When there is a similarity of electrical properties (e.g. high dipole element between solute and solvent) the solute-solvent attractions are particularly strong. When there is dissimilarity, solute-solvent attractions are weak. For this reason, a polar substance such as water is a good solvent for a polar substance such as detergent soap and a poor solvent for a non-polar substance such as gasoline.

**Uses of Cleaning Solvents**

| Cleaning Solvents | | Uses |
|---|---|---|
| 1. Gasoline | - | used to wash oil/greasy tools/ equipment |
| 2. Diesoline | - | used to wash oil engine, transmission and other parts of the vehicle |
| 3. Kerosene | - | used to remove dust, grease oil, paint, etc. |
| 4. Thinner | - | used to remove spilled paint on the floor, walls and tools |
| 5. Soap and water | - | used to wash/clean upholstered furniture such as seats, tables, cabinets, etc. |

**Occupational Health and Safety Practices in Handling Cleaning Solvents**

A great percentage of eye injury and cuts results from a disregard for the simplest rules in handling cleaning solvents. You should never use compressed air to clean your clothes, hands or body. The pressure can cause the cleaning solvents and dirt particles to penetrate your skin, resulting in infection and /or blood poisoning.

Do not use compressed air to clean an object immediately after it has been removed from a hot cleaning tank. Rinse the cleaning solvents away with water. Do not use carbon tetrachloride as a cleaning solution. The fumes when inhaled can cause serious internal injury and possibly result in death. In steam-cleaning, place the object to be cleaned on a pallet and wear a face shield and rubber gloves for protection against loose debris.

If a job or cleaning task requires the use of gloves, use the appropriate gloves. If you have cut, nicked, or burned yourself, or something has got into your eyes, report immediately to the first-aid person.

Keep all inflammable cleaning solvents in closed tin containers and whenever possible, store them in a separate area.

**Tools and Equipment Maintenance**

Tools and equipment in the shop are classified into three main types. One type is known as hand tools because your hand supplies the energy to operate them. The other type is called machine or power tools/equipment which uses either electricity, compressed air, or hydraulic pressure to make them operate. The last type is referred to as measuring tools.

**Tips and Techniques**

The best way to keep the tools in good condition is to just clean them. If you take care of your tools, they last longer, bringing value to the masons.

If mortar builds up on the tools and is not cleaned in a timely manner, special cleaners may be needed.

Basically, advantages outweigh the disadvantages on the proper usage of tools and equipment. Below are some common advantages:

1. Efficiency of the work
2. High quality of the work
3. Speed of accomplishment
4. Accuracy

**Water and More**

- Water is the best cleaning agent for small and larger tools. In most cases, nothing more than water is required to keep the tools in top condition.
- If mortar has hardened on the tools, and water is not sufficient to remove it, muriatic acid can be used to clean the tools. This acid can cause damage, so it should be used sparingly and rinsed off thoroughly. Muriatic acid is not safe on aluminum, zinc or stainless steel.
- If the mortar sits too long and builds up on the mortarboard, any kind of concrete dissolver will work to clean it.
- A non-porous, smooth surface with a concave at the middle portion helps the mortar board to keep water for greater workability.
- Masonry mortar does not bond to the working surface. You might get a 1/8-inch thick skim coat, but it is easily removed by knocking the mortarboard on the ground or hitting it with a hammer, noting that if water doesn't completely clean the surface, a heavy-duty cleaner is needed.

**Preventive Maintenance**

- Preventive maintenance using preservatives can keep wooden tools in top shape by preventing the wood from splitting.
- Linseed oil is recommended for wooden levels and wooden handles. It protects against splitting and spalling when the wooden part gets wet repeatedly due to constant use.
- However, some metal tools like trowels are prone to rust. But if they are used almost everyday, rust and other unwanted elements will wear off naturally which keeps them clean always.

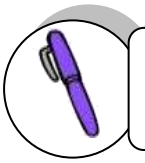
**Routine Service for Handhelds**

- If a hammer handle becomes loose, it should be replaced immediately. The hammers should be sharpened by a blacksmith and never through a grinder since the temper of the hammer is lost through grinding.

- Good maintenance of your carbide chisels lets you cut faster and accurately. However, improper grinding can damage the carbide and cause tool failure. Never forget to grind the shank end or strike the head frequently to maintain the correct shape for safer performance.
- If you need to tighten up a wooden handle, insert another wedge into the end of the handle or immerse the hammer head into a bucket of water overnight to expand the wood.
- For striking tools with carbide tips, storing properly is important. Extra care must be exercised not to strike carbide tools against each other since this may break the carbide into pieces.

**Maintain and Service Motorized Product**

Frequently used equipment also needs a squirt of grease. They require minimum and periodic maintenance. You have to change the engine oil occasionally so as the tires once worn out. Tire pressure should be checked regularly for safety reason as well as prolonging their lifespan.



## How Much Have You Learned?

**Self-Check 2.1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which is the best way to keep the tools in good condition?
   A. Keep them immediately without cleaning.
   B. Clean them while they are in the tool cabinet.
   C. Clean them before storage.
   D. Place them in a bucket of water.

2. Most handheld masonry tools can be cleaned by___
   A. Kerosene
   B. clean water
   C. Oil
   D. Cleaning agent provided by the manufacturer

3. When do we use the muriatic acid in masonry?
   A. To harden up mortar.
   B. To remove hardened mortar on the tools.
   C. To get rid off of harmful elements from the mortar.
   D. To wash off the masonry materials.

4. What is used as preventive maintenance for wooden tools?
   A. Water
   B. Kerosene
   C. Linseed oil
   D. muriatic acid

5. Why do we have to check frequently the hammers for signs of chipping, cracking or unusual signs of defects?
   A. To assure that there are no missing tools.
   B. To ensure that they are well classified.
   C. To ensure that they are in perfect condition.
   D. To maintain their price value

6. What is the best way to prevent tools from rusting?
   A. Wipe the tools with oil.
   B. Keep the tools in an air conditioned room.
   C. Keep them in their boxes always.
   D. Keep the tools clean and dry before and while in the storage.

7. What is the best way to prevent tools from rusting?
   A. Wipe the tools with oil.
   B. Keep the tools in an air conditioned room.
   C. Keep them in their boxes always.
   D. Keep the tools clean and dry before and while in the storage.

8. Which is an advantage of the proper use of tools and equipment?
   A. Accuracy in job/task performance is achieved.
   B. Shop efficiency is promoted.
   C. There is high quality of work.
   D. All of the above.

9. What will happen if mortar is not cleaned off from the tools?
   A. The mortar will build up and harden.
   B. The mortar will build up but can be removed too easily.
   C. The tools cannot anymore be used.
   D. Just ignore it for it won't matter anyway.

10. What do you do when a wooden handle needs to tighten up?
   A. Ignore it because that is a useless case.
   B. Tie it around either with a rope or tie wire.
   C. Insert another wedge or immerse the hammer head into the bucket with water overnight.
   D. Bring it immediately to the carpenter for repair.

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Show that you learned something by doing this activity.**

**Activity Sheet 2.1**

**I.** Describe the following and explain their appropriate uses:

1. Lubricant
2. Petroleum oils
3. Naphthenic oils
4. Paraffinic oils
5. Rust remover
6. Solvents
7. Solute
8. Silicones
9. Synthetic oils
10. Synthetic greases

**II.** Identify five (5) different tools. List down specific preventive maintenance tasks for each of these tools.

**Job Sheet 2.1**

**III.** Perform a preventive maintenance for tools/equipment and in the workplace. This is a group activity.

A. Bring cleaning solvents, rags, brooms, air compressor, washing pan and safety apparel.

B. Clean tools and work area and observing Occupational Health and Safety practices.

**Procedure:**

A. Tools

1. Wear protective clothing and goggles.
2. Gather the tools to be cleaned in the designated area for cleaning.
3. Classify the tools to be cleaned according to their condition.
4. Measure and pour enough amount of cleaning solvent to the washing pan.
5. Place the tools in the washing pan.
6. Use paint brush to remove the dirt from the tools.
7. Get the tools from the washing pan and wipe them with rags until dry.
8. Clean and keep all materials used for cleaning.

B. Work Area

1. Wear protective clothing and goggles.
2. If dirt like paint, used oil, grease, and rust stick to the floor, use appropriate cleaning solvent to remove it.
3. Use the air compressor to dry the floor and the broom in cleaning the remaining dirt in the work area.

# How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

*Assessment:* You will be assessed based on the performance criteria listed below:

| PERFORMANCE CRITERIA | PERFORMANCE LEVEL | | |
|---|---|---|---|
| | YES | NO | NA |
| 1. Were protective clothing and goggles worn at all times? | | | |
| 2. Were tools and equipment free of dust, grease, oil and other substances? | | | |
| 3. Was the work area dry, free of dust, grease and other substances? | | | |
| 4. Were excess cleaning substances cleaned and kept in proper places? | | | |
| Overall Performance | ☐ Satisfactory<br>☐ Unsatisfactory | | |

Student's name: _____

Teacher's comment: _____
_____
_____

# How Do You Extend Your Learning?

**Assignment Sheet 2.1**

**Directions:** Visit a shop of your choice. Find out from the shop owner or worker how preventive maintenance of tools and equipment is done. Also, find out the problems met in implementing this mandatory requirement.

# LEARNING OUTCOME 3

**Store tools and equipment**

## PERFORMANCE STANDARDS

- Inventory of tools, instruments, and equipment are conducted and recorded as per company practices.
- Tools and equipment are stored safely in accordance with manufacturer's specifications or company procedures.

## What Do You Already Know?

**Let us determine how much you already know about storing tools and equipment. Take this test.**

**Pretest LO 1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which was created by virtue of Executive Order No. 307, on Nov. 1987?
   A. Department of Labor and Employment
   B. Office of the President
   C. Department of Public Works and Highways
   D. Occupational Safety and Health Center

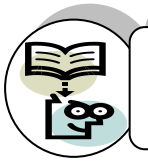
2. Which is the mandate of this agency?
   A. Protect the Filipino workers against accidents and illnesses.
   B. Let the workers choose their own type of job.
   C. Help the employers gain profits from their business.
   D. Protect the right of the employers.

3. It is a detailed list of all the items in stock.
   A. Delivery Receipt
   B. List of Merchandise
   C. Inventory
   D. Directory

4. Which is true?
   A. Create a sign out sheet for all shop tools.
   B. Conduct an audit for long-term jobs.
   C. Restrict shop tool access to one individual.
   D. All of the above.

5. Its advantage is to find out whether tools and equipment are complete, in proper quality, and quantity.

A. Delivery Receipt
B. List of Merchandise
C. Inventory
D. Directory



# What Do You Need To Know?

**Read Information Sheet 3.1 very well then find out how much you can remember and how much you learned by doing Self-check 3.1.**

**Information Sheet 3.1**

## STORE TOOLS AND EQUIPMENT

### A. Tools and Equipment Inventory

Some companies often spend more time in tracking and managing their inventory. Others --- such as manufacturers, producers and construction companies --- may use specific equipment for specific jobs. This creates a difficult situation of attempting to manage inventory at multiple job locations. Business owners and managers typically create systems or processes that employees must follow when using the company's shop tools.

Depending on the type of company, owners or managers may require employees to use own tools for certain jobs. For example, construction companies may require employees to have their own items such as a hammer, painting equipment or welding supplies. This reduces inventory management.

Whatever is the type of company or shop, inventory taking is very important. On this context, inventory is defined as a detailed list of all the items in stock.

### Reason for Maintaining Tools and Equipment Inventory

The most important point to consider is to purchase top-grade tools. They must be made of high-quality steel and manufactured for precision. Special consideration is given to balance so that the tool/equipment will be properly maintained and prevent loses. Since the technician must work with his tools daily, regular inventory of tools/equipment is very important.

The initial cost of a minimum number of tools is high but there is accompanying warranty guarantees satisfaction and many years of service. It is better, in the long run, to start with a few carefully selected tools that will take care of your most common needs and then gradually build-up to a complete set. It is sometimes hard to identify and memorize the huge number of tools and equipment in the workshop, maintaining the inventory record is of great value.

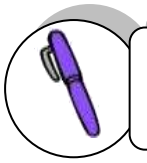
**Points to Consider**

- Create a sign out sheet for all shop tools. Companies can use a sign out sheet where employees must fill up with specific information relating to the inventory item and specific job use. This allows business owners and managers to know where each tool is located at all times.

- Conduct an audit for long-term jobs. Shop tools left at working place for long periods may require a manager to verify that the tool is still on the job site. A manager can visit the site unannounced and review the sign out sheet against all tools on the job.

- Restrict shop tool access to one individual. This allows companies to have one person on each job responsible for checking out, or in, various shop tools. Companies can require this individual to be a manager or foreman.

- Use a barcode system to track inventory. Companies can place barcode labels on each shop tool and require employees to electronically scan each tool when using them at different job sites. This creates an electronic record and can allow real-time reporting of tool use.



# How Much Have You Learned?

**Self-Check 3.1**

**Directions:** Choose the letter of the best answer. Write the answer on your answer sheet.

1. Which was created by virtue of Executive Order No. 307, on Nov. 1987?
   A. Department of Labor and Employment
   B. Office of the President
   C. Department of Public Works and Highways
   D. Occupational Safety and Health Center

2. Which is the mandate of this agency?
   A. Protect the Filipino workers against accidents and illnesses.
   B. Let the workers choose their own type of job.
   C. Help the employers gain profits from their business.
   D. Protect the right of the employers.

3. It is a detailed list of all the items in stock.
   A. Delivery Receipt
   B. List of Merchandise
   C. Inventory
   D. Directory

4. Which is true?
   A. Create a sign out sheet for all shop tools.
   B. Conduct an audit for long-term jobs.
   C. Restrict shop tool access to one individual.
   D. All of the above.

5. One advantage of this system is to find out whether tools and equipment are complete, in proper quality, and quantity.
   A. A. Delivery Receipt
   B. List of Merchandise
   C. Inventory
   D. Directory

**Refer to the Answer Key. What is your score?**

# How Do You Apply What You Have Learned?

**Activity Sheet 3.1**

**I.** This is a work group.

1. Conduct a 15-minute buzz session to come up with your own inventory system as if you own a shop.
2. Then, prepare your output on butcher's papers for presentation to and discussion with the entire class.

**Job Sheet 3.1**

**II.** Conduct a 10-minute inventory of tools and equipment in the shop using the group's inventory form. The main considerations of this inventory are:

1. Total tools and equipment on hand according to type.
2. Checking out against the Memorandum Receipt as to losses or missing.
3. Quantity of damaged tools and equipment and your appropriate recommendations.

**Procedure:**

1. Prepare the form.
2. Secure the Memorandum Receipt from the teacher to check for missing or losses against your inventory.
3. Record your findings in the inventory form.
4. Give your appropriate recommendations for damaged tools and equipment identified.

## How Well Did You Perform?

**Find out by accomplishing the Scoring Rubric honestly and sincerely. Remember it is your learning at stake!**

### Rubric to be used for assessment

| PERFORMANCE CRITERIA | PERFORMANCE LEVEL | | |
|---|---|---|---|
| | YES | NO | NA |
| 1. Were the Record Book and the Inventory Form secured from your trainer before starting the performance of task? | | | |
| 2. Were all tools of different sizes, conditions and quantities checked and recorded in the inventory form? | | | |
| 3. Were all equipment of different ratings/capacities, conditions and quantities checked and recorded in the inventory form? | | | |
| 4. Were damaged/lost tools/equipment identified and recorded? | | | |
| 5. Were repair recommendations made for the damaged but repairable tools/equipment? | | | |
| 6. Were reports on damaged tools/equipment submitted and accurate? | | | |
| Overall Performance | ☐ Satisfactory<br>☐ Unsatisfactory | | |

Student's name: _____

Teacher's comment: _____
_____
_____

# How Do You Extend Your Learning?

Assignment Sheet 3.1

This is a group work. Prepare for a 10-minute panel discussion on OSHC pertinent regulations for construction workers.

Below is the rubric to be used for the group performance:

**Symbols and Meaning:**

**___√+ Consistently ___√ Usually ___√- Seldom**

Knowledge:

____ The group used research to advance arguments and defend positions.

____ Research was effectively applied to arguments.

Understanding:

____ The group demonstrates understanding of the issue.

____ The group presented key points.

____ The group presented original ideas.

____ The group was able to use examples or analogies to defend an argument.

____ The group demonstrated empathy for the cause he or she represented.

____ The group showed respect for others' opinions.

Communication:

____ The group was logical in presenting arguments.

____ The group was able to communicate effectively and clearly.

____ The group incorporated key terminology/vocabulary.

Participation:

____ The student contributed to the discussion.

____ The student tended to dominate a discussion, thereby hindering others' participation.

For group evaluation:

____ All students participated in the discussion.

____ Students within the group tended to dominate discussion within the group, hindering other group members' participation?

**Congratulations! You did a great job!**

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# ANSWER KEYS:

## What do you already know?

## Lesson 1

**LO1**

1. B
2. D
3. C
4. C
5. D
6. C
7. D
8. D
9. D
10. D

**LO2**

1. B
2. C
3. A
4. B
5. D

**LO3**

1. D
2. D
3. C
4. C
5. D

## Lesson 2

**LO1**

1. D
2. D
3. C
4. D
5. D
6. A
7. B
8. D
9. D
10. C

**LO2**

1. C
2. D
3. C
4. D
5. B
6. B
7. A
8. B
9. B
10. D

## Lesson 3

**LO1**

1. C
2. D
3. B
4. A
5. D
6. A
7. B
8. B
9. A
10. D

**LO2**

1. A
2. A
3. D
4. B
5. C
6. A
7. C
8. B
9. C
10. C

**LO3**

1. D
2. D
3. B
4. B
5. D

## Lesson 4

**LO 1**

1. D
2. C
3. D
4. A
5. B

**LO 2**

1. D
2. D
3. A
4. B
5. D

**Lesson 5**

**LO 1**

1. C
2. D
3. C
4. A
5. B
6. B
7. C
8. C
9. D
10. D

**LO2**

1. C
2. B
3. B
4. C
5. C.
6. D
7. D
8. D
9. A
10. C

**LO3**

1. D
2. A
3. C
4. D
5. C

## How much have you learned?

**Lesson 1**

**LO1**

1. B
2. D
3. C
4. C
5. D
6. C
7. D
8. D
9. D
10. D

**LO2**

1. B
2. C
3. A
4. B
5. D

**LO3**

1. D
2. D
3. C
4. C
5. D

**Lesson 2**

**LO1**

1. C
2. D
3. C
4. D
5. B
6. B
7. A
8. B
9. B
10. C

**LO2**

1. D
2. D
3. C
4. D
5. D
6. A
7. B
8. D
9. D
10. D

**Lesson 3**

**LO1**

1. C
2. D
3. B
4. A
5. D
6. A
7. B
8. B
9. A
10. D

**LO2**

1. Installation Manual
2. Troubleshooting
3. Assembly Instruction
4. Product Specification
5. Safety Instruction

**LO3**

1. D
2. D
3. B
4. B
5. D

**Lesson 4**

LO1

1. D
2. C
3. D
4. A
5. B

LO2

I.
1.Cube
2. Cylinder
3. Sphere
4. Hexagon

II.
1. Use of level hose
2. Plumb bob
3. Spirit level
4. Measuring tape
5. Plywood ¼ thick
6. Framing square

**Lesson 5**

LO1

1. B
2. D
3. C
4. D
5. D
6. D
7. D
8. A
9. B
10. D

LO2

1. C
2. B
3. B
4. C
5. C
6. D
7. D
8. D
9. A
10. C

LO3

1. D
2. A
3. C
4. D
5. C

# *Acknowledgement*

This Learning Module was developed for the Exploratory Courses in Technology and Livelihood Education, Grades 7 and 8 of the K to 12 Curriculum with the assistance of the following persons:

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